

THE AUTOMOBILE

HOW PRODUCTION PROBLEMS ARE SOLVED

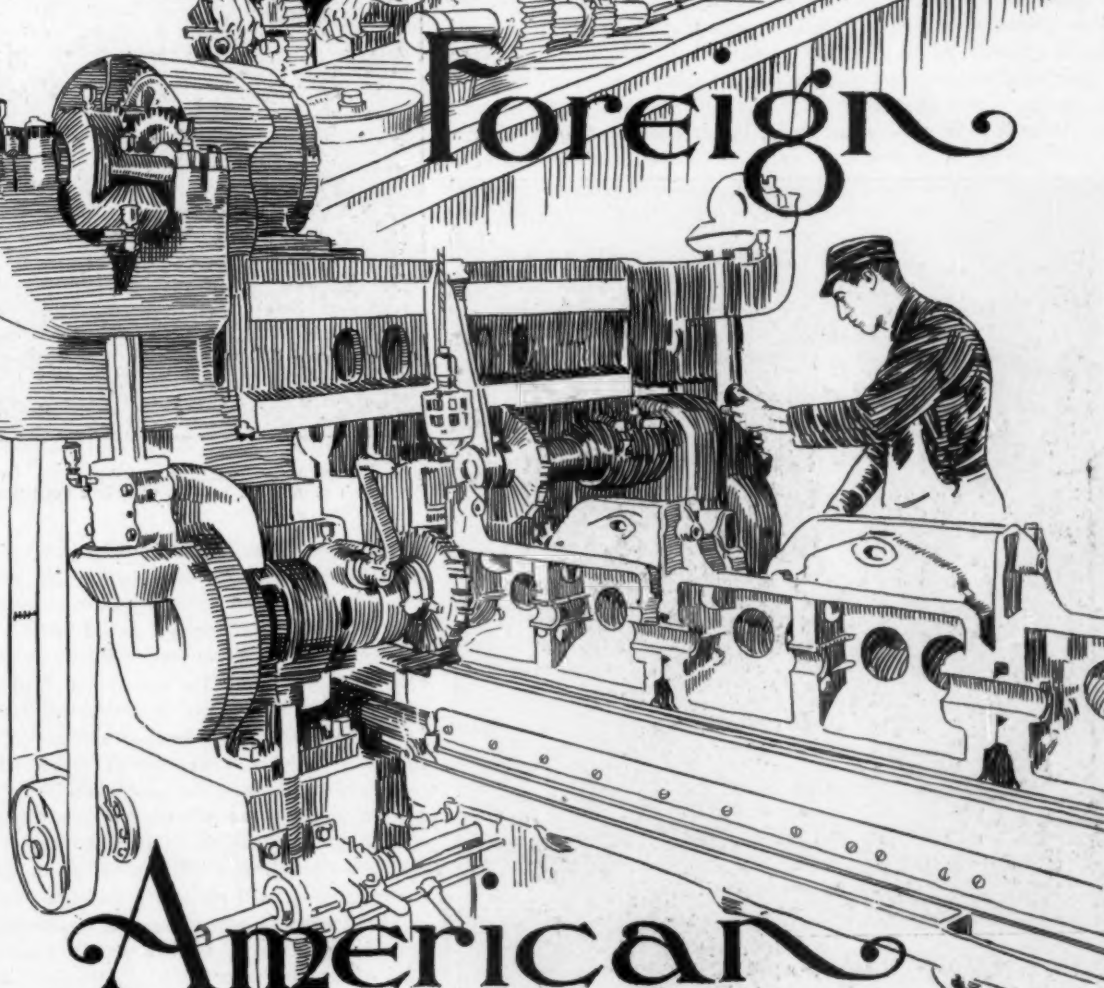
A BROAD when automobiles first attracted the notice of manufacturers, they were taken up by the character of men who previously devoted themselves to the building of carriages, and other means of animal transportation. Machine methods of manufacture were taken advantage of to a slight extent only, and it was believed that the "forge" and the



Foreign

"bench" were of greater utility than any other way. Skilled labor is plentiful in foreign lands; it is willing to work for many hours in the day, and the cost per diem per man is below that which must be paid to capable artisans in American shops, and the influence on the finished automobiles, in view of this method of manufacture, is obviously that which leaves the earmarks of the individual workman on the respective automobiles.

The finished product so made is at the expense of an unusually large number of man-hours, and the quality of the product, aside from the question of the material employed, is the net and direct result of the skill of the workmen employed,



American

The total cost of these cars would be enormously high in America, because living wages are paid to the men who do the work, and in this country, in order to be able to satisfy all phases of the problem, dependence is put upon highly developed

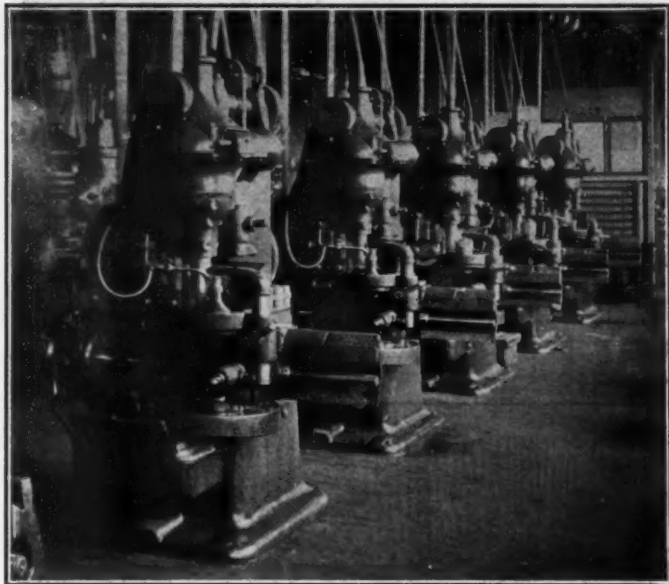


Fig. 2—Battery of Fellow's shapers, which are substantially automatic, requiring but one man to keep them running

machine tools, under certain well-defined conditions of manufacture, thus eliminating the army of workmen, unusually long hours of labor, and certain other involved variables.

Despite the cheapness of labor as it obtains abroad, and the low price commanded for the materials used, the prices of foreign automobiles were found to be so high that they were regarded in this country as toys for the luxuriantly inclined. Experience, and the extension of output, tended to the lowering of the unit price of cars so made, but it was soon found that a

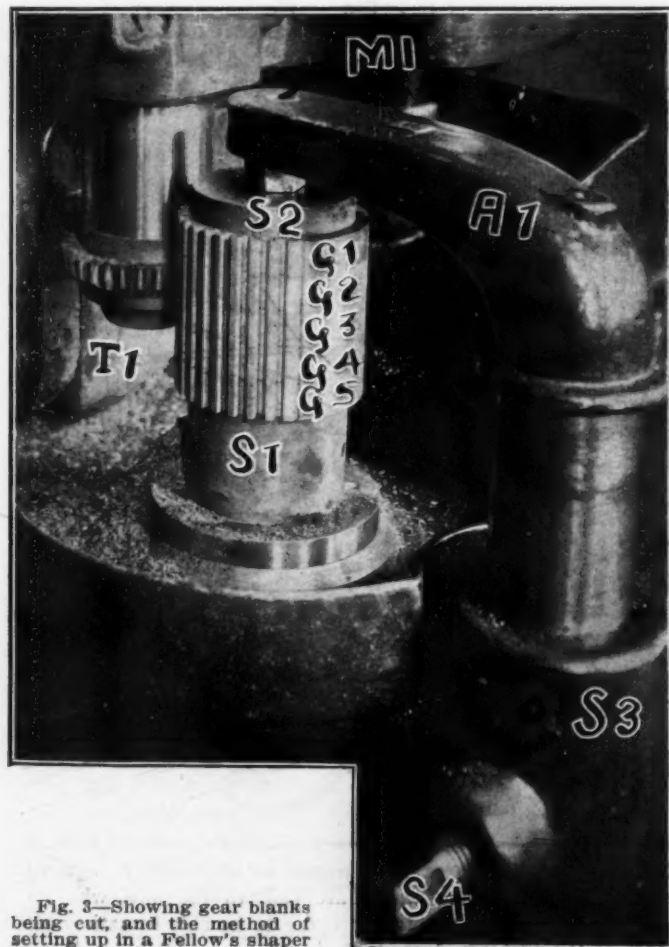


Fig. 3—Showing gear blanks being cut, and the method of setting up in a Fellow's shaper

popular level could not be reached, even when the workmen were urged to the point where a semblance of interchangeability of the parts is all that could be claimed.

Some of the earlier efforts in America were in replica of these foreign attempts, modified somewhat perhaps, by the influence which the machine tool methods of that time necessarily brought to bear. Under such conditions, even the American manufacturing situation left a trail of formidable difficulties, which had to be erased before it could be said that quality and price were as companions in the enterprise.

HERE WERE IMPORTANT MATTERS TO BE CONSIDERED

It was soon ascertained that interchangeability of the component parts of automobiles was not possible when a plurality of men were depended upon for co-operation in the process, nor did it matter if the men, severally, were skilled. No two men, however equipped with instruments of precision, are agreed as to the dimensions of given parts, although it is true that the amount of the disagreement is but slight in many cases. The difference is always sufficient to make it impossible to ship a repair for an automobile to a distant point, and feel that it will go into place without having to be dressed and fitted at

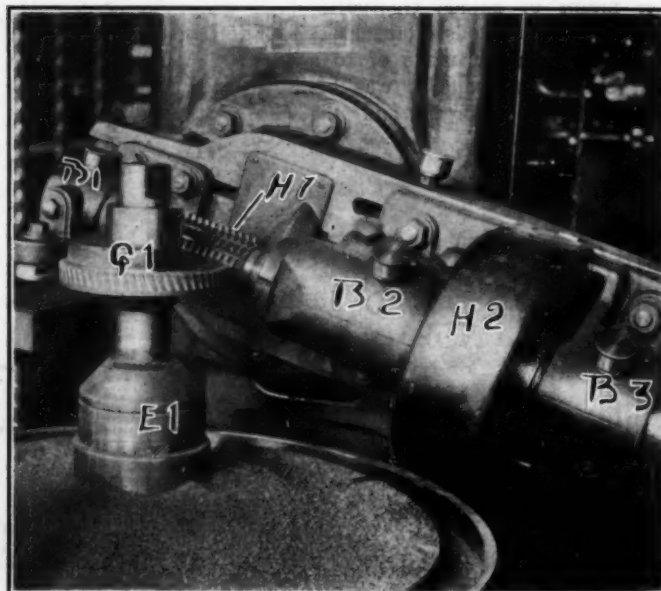


Fig. 4—Hobbing machine working on the balancing gear of a Brush Runabout motor, showing continuous cutting operation

the expense of some skill on the part of the man who may do the work, and with a fair chance that the part may have to be centered in a lathe or in a grinder, and brought down to suitable dimensions, all things considered.

Interchangeability of the component parts must certainly be regarded as one of the important considerations, but a hand-whittled automobile can never measure up to this requirement, because the limit of tolerance will never strike within the range required. As an illustration of the exactness demanded, if the parts are to be interchangeable, it is only necessary to call attention to the great influence that a slight change in dimensions will have upon the fit of certain parts. It is well understood that a flywheel, for instance, if it is not securely adhered to the crankshaft will go adrift, and the damage it will do, in view of the energy it stores, is past reckoning. Let it be assumed that the flywheel is fetched up on a taper, which may be say, $\frac{3}{16}$ of one inch per foot. Were the diameter of this taper to vary from a given standard by barely 0.001 of an inch, the flywheel would have to be moved up on the taper 1-16 of one inch. In other words, for every variation in diameter of the taper, the axilewise movement of the flywheel on the shaft will be 62 1-2 times the diametral variation.

The foregoing is not an unusual example of the differences which must be reckoned with when variations creep in during the manufacture of parts. That these variations will obtain, is an unavoidable certainty if a standard is not adhered to, and if each workman relies upon his own skill in the search for accuracy. In the absence of an arbitrary mechanical standard, there will be nothing but the plurality of standards of the respective operators; each one will have his own version of what he terms a neat fit, and there is nothing so surprising as the differences of opinion which actually do obtain as between men of recognized skill in this connection.

The quality of an automobile is not necessarily reflected in the design, as the same may be expressed in drawings. The engineer gives expression to his views when he supervises draftsmen, and they reduce the product of his creative genius into working drawings. The drawings serve for a certain utility purpose, if they are so clearly executed that they tell the workman what to do in definite language. It is a well established fact that while a one-inch round plug should go into a one inch hole, no one has ever succeeded in accomplishing the feat, and in practice an allowance must be made to satisfy an incongruous situation.

Limits of tolerance, if they are properly expressed upon the

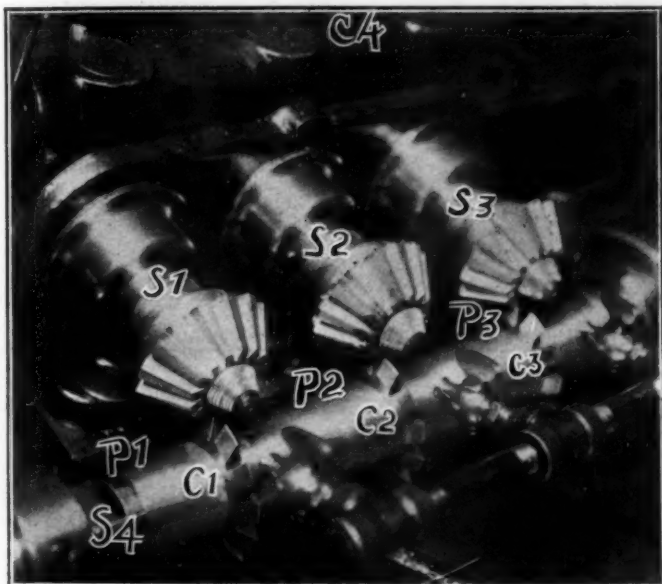


Fig. 5—Beveled pinions in a gashing machine with fixed cutters working three sets at one time

working drawings, tell the workman how much of an allowance he may be permitted to make, having in mind the necessity of so manufacturing the parts that they will satisfy the interchangeability idea. These limits must be varied with the diameters of relating parts, as for illustration, the practicable difference, considering a part with a one inch diameter, may be considerably less than the difference which will have to be instituted when the parts are say six inches in diameter.

This situation is so fraught with complication that the tabular values of the allowable limits of tolerance, require years of refinements ere it can be said that the interchangeable situation will be adequately represented, and the principle of operation is such that the algebraic sum of the allowances must be equal to zero.

PREDETERMINED INACCURACY PRESENTS THE RIGHT IDEA

From what has been said, a normal conclusion may be reached when it is decided to control the inaccuracies with the drawings in hand with which to execute the scheme of the designer, and the limits of tolerance thereon, which will tell of the allowable variations; the workman may then be permitted to proceed, but unaided by some further and scientific process, he cannot possibly execute the design on a basis of interchangeability. If it

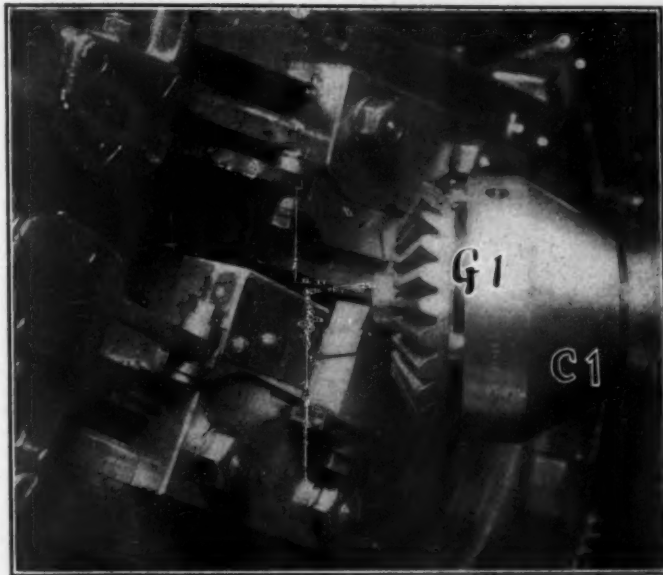


Fig. 6—Gleason planer profiling bevel gears after they have been gashed in the milling machine

is admitted that no two workmen can measure a given diameter of a part and arrive at the same conclusion, this is equal to admitting that no two workmen can make a given allowance in departure from a neat diameter. It is just as difficult to machine a part down to some variable from a fixed diameter; as it is to execute the work in the absence of any allowance at all, unless it is true that the allowable variation is several times that which should obtain on a basis of the interchangeability of parts.

Even with the accurate machine methods, as they obtain at the present time in America, limits of tolerance must be taken advantage of in order to satisfy the situation. The machine process has for its basis the quick and



Fig. 7—Double spindle vertical boring equipment with a special fixture, working on Regal cylinders

substantially accurate method of production so contrived that the variable, whatever it is, will be the same in all the parts produced, no matter how many men are employed, or which one of them performs a given operation.

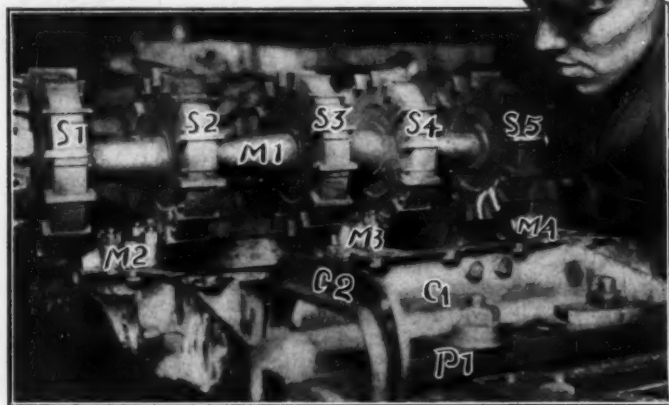


Fig. 8—Regal crankcase having main bearings ended off by means of a straddle mill set on a large milling machine

What the American makers of automobiles started out to do was to reduce the cost of automobiles without reducing the quality thereof. They were compelled to consider the higher cost of American labor, and the use of good material naturally had a further influence on the cost, with an upward trend. The very fact that American labor will take the initiative when it is left to its own devices constitutes a danger, and the personal equation represents a serious situation, which, like the inaccuracies of process, must be subdued and controlled.

DRAWINGS ARE NOT USED TO BUILD AUTOMOBILES

In the execution of the plan of the designer, since no two workmen can be depended upon to arrive at the same conclusion in measuring the dimensions of the parts, it is a self-evident fact that drawings are valueless for the purpose; what they are for, and why they are made, is quite another story. Workmen, in order that they may be utilized under conditions of rapid production, are given the required special machine tools to operate, and the parts to be machined are locked into fixtures, which are so contrived that they serve as jigs, and the cutting processes, whatever they may be, are done by means of

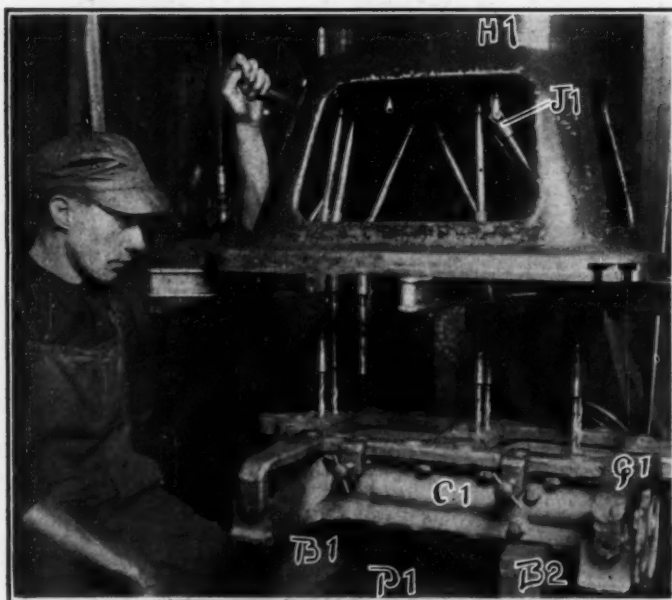


Fig. 9—A multiple spindle drill having 16 spindles, some of which are engaged on a Regal crankcase, guided by a jig

special tools, which are sharpened and sized in a tool room by men who are schooled in the art. Under such conditions, if a workman is required to drill say four holes in the flange plate of a cylinder, all he can do is to mount the cylinder into a fixture in the one way that it will go, lock it into place, and with the drill given him, which is properly sized before he gets it, drill the four holes just where they register, by means of the jig plate, which is a part of the fixture.

What the drawings are for, then, is to guide the toolmakers who produce the special fixtures, jigs, gauges and tools. If there is any inaccuracy it is that which will come from mistakes made by the toolmaker specialists. By a system of checking in the

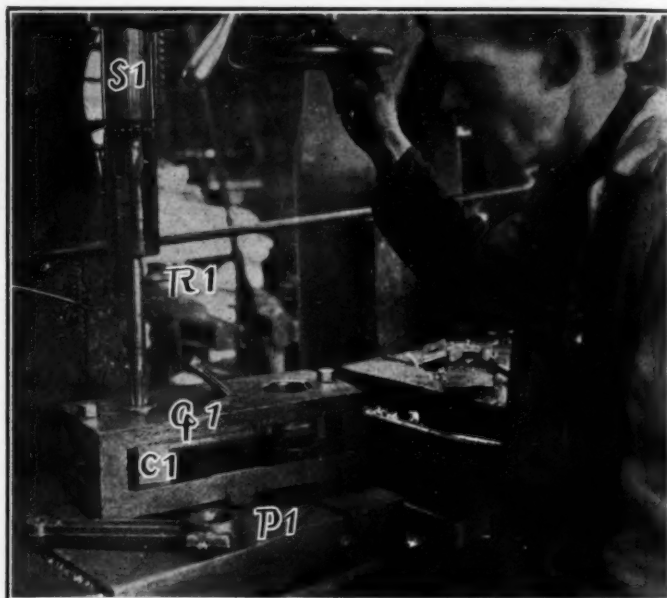


Fig. 10—Multiple spindle drill in the Regal plant working in conjunction with a jig fixture, reaming connecting rods

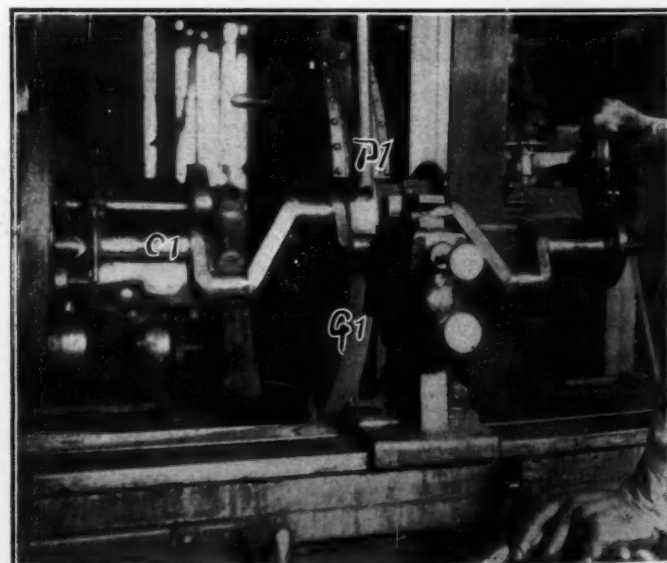


Fig. 11—Landis Grinder in the Regal plant finishing crankshaft bearings to make them round and true

tool room, all such mistakes are likely to be discovered. Even if a mistake should be made in the production of a fixture, it does not necessarily react to disadvantage, because every automobile produced will have this mistake in it and the parts will be interchangeable notwithstanding its presence. It is perfectly feasible to standardize a part, even though departure may be made from the drawings, the difference, if it creeps in during the production of the tools, may be tolerated if only it does

not interfere with the manufacture and assembling of the products, nor is it far-fetched to reach the conclusion that a mistake from the toolmaker's point of view, ceases to be such.

DIVERS MAKERS FURNISH A WORKING EXAMPLE

If it is understood that the accuracy and speed of production is dependent upon the process and the machinery equipment, rather than upon the skill of the workmen and other like considerations, the reader will be ready to go into the shops and review the processes involved and employed, in order to learn why it is that American automobiles may be produced in the large numbers that they are, and be the better for it. The very facts reviewed thus far reflect quality as the companion of

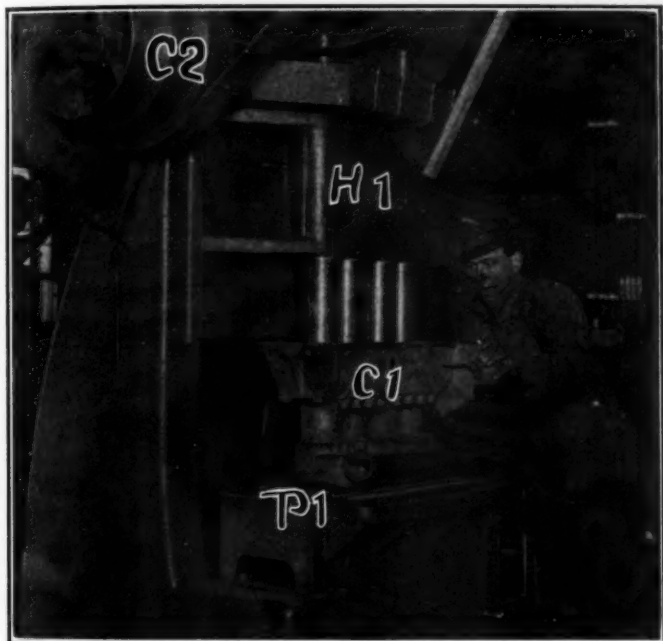


Fig. 12—Special vertical boring mill with 4 spindles so spaced as to finish Everitt en bloc cylinders simultaneously

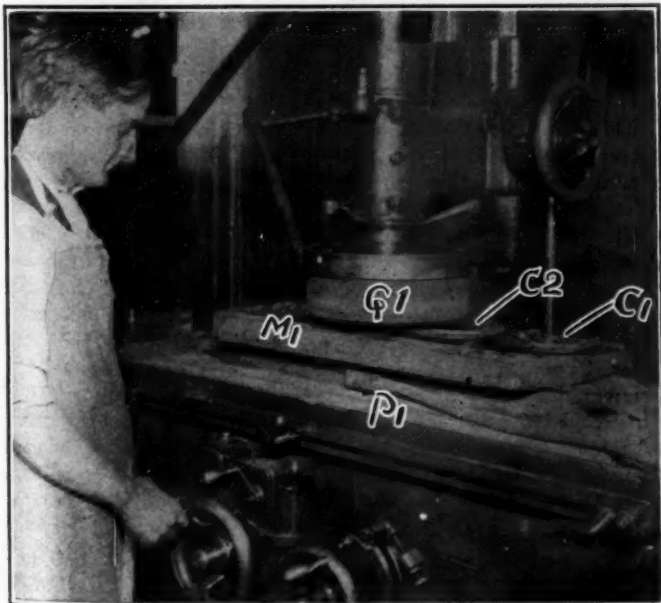


Fig. 13—Flat grinder with magnetic chuck working on hand-hole plates in the Excelsior plant

quantity, and the trend of the theme has for its foundation the fact that interchangeability of parts, and harmony in the relation of the components, cannot be the child of the individual uncontrolled efforts of men however skilled they may be.

Multiple operations are taken advantage of to a marvelous

extent, and it is of course true that a machine tool, if it will turn out five parts instead of one, will do the work of five men



Fig. 14—Piston ring grinder with magnetic chuck finishing piston rings for Excelsior motors

at the cost of one. On the other hand, if it will do the work of one man with sufficient accuracy for its intended purpose, the same accuracy will obtain for all of the operations.

The special machine tools which are designed for multiple operations are so made in many cases that they perform their respective functions continuously. Turntable platens in some cases permit of setting up work to be done at one point on the platens, while work is being done by the tool at some other point thereon.

THE AUTOMATIC PRINCIPLE IS TAKEN ADVANTAGE OF

In divers examples, the multiple operation idea fails to satisfy the needs of the situation, and automatic machine tools are introduced in order to expedite work. Fig. 2 shows a row of Fellow's shapers which are excellent representatives of this idea. This equipment is in part representative of the process utilized in
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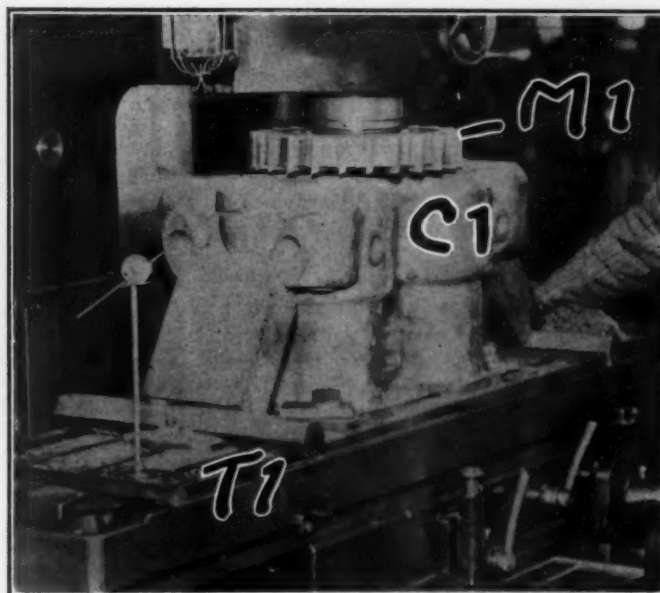


Fig. 15—Cat head on a No. 4 vertical Cincinnati mill finishing 4 Excelsior cylinders at one time

BEST MEANS FOR DUSTPROOFING THE HIGHWAY

By MARIUS C. KRARUP

ONE of the objects of this article is to contribute to the success of the good roads agitation by pointing out a systematic method for making information on the subject of dustless roads applicable to any given set of requirements. Incidentally, it will appear, by this method, that the available information is insufficient for this purpose and in need of being supplemented.

A mass of scattered literature has been accumulated, here and abroad, during the past ten years, on the subject of improved, modern road construction and maintenance, with special reference to the damage done to the best roads of the earlier types by rapid automobile traffic, to the means for avoiding this injury to the roadbed and, most particularly, to that symptom of destructive road wear which is in itself a nuisance and a source of disease and expense: The dust.

But this literature, expensive as it is, must be read with pen in hand and copious taking of notes, if the reader shall avoid feeling himself driven by the strong current of events and opinions toward the acceptance of certain conclusions which after all may not be fully justified or applicable to the practical case of contemplated road improvement with regard to which he seeks enlightenment. On the surface of all records of recent achievements in road improvement there is written a strong testimonial to the superior qualities of the new-built macadam road, protected against subsoil water by drainage and against rain and detrition by immersion of its materials in a matrix of refined coal tar. Durability, long-time economy and freedom from dust, noise and vibration seem to be demonstrated as more fully combined in this type of road, properly built, than in any other. Built for heavy traffic, it should, according to widely accepted data, offer decided advantages over granite setts, and, built for light traffic, it should prove cheaper than an ordinary graveled or stoned country road, by reason of reduced cost for maintenance. In the light of plain engineering, which assumes that the higher first cost may be defrayed by means of a loan drawing 4 per cent. interest or by some other legitimate financial operation on the part of the community which is to pay the cost, there seems to be no reason why roads of any other type should be built. The freedom from dust is a gratuitous addition to its advantages. This conclusion, however, is flatly contradicted in practice. The measurement of road values in absolute dollars and cents is not accepted, partly because the values considered are always prospective, but also for other reasons. Political, legal, financial, economical, engineering and labor conditions conspire to render the stupendous American road problem one of the most complex with which any man can grapple. And little has been done to simplify it.

Only those who refuse to recognize road improvement as urgent have a simple solution—this of doing nothing or as little as possible. Their position may be similar, in some respects, to that of the "common people" of whom Lincoln said, that God must like them, since he made so many of them. They refuse to be stampeded into paying, wholly or in part, for building an expensive road where only a dirt track is needed for occasional travel, in their judgment. In the rubbing and jostling of opposing interests, they represent properly the thousands of miles of roads which should not be improved by public means, because they carry little traffic and would not carry much more traffic of economic value if they were improved. In the great division of the road problem, as to where roads should be improved and how roads should be improved, they represent the questions under the first branch as intelligently as anybody, but trespass, of course, on the second, as all conservative interests do when roused by opposition. When they are in error in a financial comparison between the final costs of one type of road and a better one, and choose the type involving lesser risk rather than the one

promising most economical results, it is fair to presume not that they are temperamentally opposed to progress, but that no convincing argument has been placed before them, or that they have observed many discouraging cases within their own municipal experience, where incapacity or corruption saddled a heavy burden of maintenance upon a community through the miserable execution of excellent plans. From this point of view, the problem of the good roads movement becomes largely the problem of establishing a reliable system of guarantees for the proper selection of the most advisable type of road in each case, for the proper workmanship in its construction and for the maintenance of the road for a definite period, such as twenty years. Often the legal status interferes with the establishments of such guarantees as alone would satisfy hardheaded objectors. Frequently local ordinances relating to the debt limits prevent the financing of a project which is meritorious only if financed with thorough provisions for continued maintenance of the values which it is to establish.

The questions of proper financing and of proper guarantees are now admitted by several authoritative good roads advocates to constitute part and parcel of the problem of comparative road economy. Road values, as pronounced by the road engineer, are consequently subject to modifications, accordingly as the financing and the guarantees actually available are more or less removed from perfection.

The Romans, of old, removed the questions of maintenance cost and organization by building deeply founded, broad-based stone roads to last for ages without repairs, and they settled the question of location by military edict and the difficulty of high first cost by employing serf labor, but in a self-ruling State composed of self-ruling communities, the majority of voters must somehow be convinced that they get value, and not only that the intangible and faraway abstraction, known as the State or the larger commonwealth is benefitted. To get order out of chaos and indecision under democratic institutions, a strong, convincing educational campaign is admitted by all to be a requisite, but in the matter of dustless road construction there is at present only a mass of road engineers' notes and data, and to simply hurl this at the heads of the unwilling does not seem to constitute the best method of persuasion.

There is a still more important limitation to the road engineer's dictum as to the relative values of different kinds of roads. More important, at the bottom of things, than any distinction as to where a good road is justified and where a makeshift road is more sensible and more important than any consideration of difficulties in financing and guaranteeing of the work, the question whether any proposed type of road construction admits of procuring materials and labor within the boundaries of the community which must pay for these materials and labor, looms up as one which the responsible members of the communities are justified in considering in the very first line. It is related of MacAdam that he took great pride in getting much of the road construction work for which history has honored him, done by "old men and women," whose time would have been wasted in idleness, if the road building enterprises had not provided an occupation for which they were as well suited as younger persons. This had special reference to the breaking of stone at the roadside, and is, of course, inapplicable to modern American conditions, but the principle that work which is simply added to the sum of work ordinarily done in a community, and the wages for which are paid to a class of workmen who practically spend all their earnings in the local purchase of life's necessities and deposit possible savings in local banks where they become available for industry and commerce, that such work in reality costs nothing, while adding to the wealth of the community by producing a value or a luxury which is wanted,

is a tenet of social economy of which the engineer's estimate takes no cognizance, but which is honored in the decisions of many local authorities, often in contravention of ordinances which provide that the lowest responsible bid shall be accepted. And it is still a peculiarity of road work that it appeals largely to a class of workmen who have no liking for steady labor, but who are inoffensive citizens willing to work hard at intervals in order to gain leisure for other periods. Every town and village seems to have its contingent of persons who subscribe to this easy philosophy, and in the economy of the community they take the place of MacAdam's "old men and women," whose work for the improvement of the roads he considered a clear gain.

It is probably clear that acknowledgement of the claims for the greatest possible local participation in road improvement work does not restrict the usefulness of the road engineer, but on the contrary enlarges the sphere of knowledge on his subject of which he must possess himself in order to become indispensable and thereby raises his occupation to the level of a distinct branch of civil engineering, not easily to be mastered except as a specialty and life vocation.

And the activities of the great national construction companies could hardly be enlarged and diversified by any safer means than by kindling local interest in road improvements through a broad acknowledgement of the active part which the locality may often assume in the production of the materials and the labor required for the work. An example is afforded in the possibilities which exist for establishing a plant for the refining of coal tar in every town possessing gas works, it being admitted and urged by road engineers all over the civilized world, no less than by the construction companies, that the highest durability of bitulithic roads and of every road which is improved by means of coal tar treatment, depends upon obtaining perfectly definite and known grades of coal tar for the work, while at present the shipment of these grades from distant production centers represents a

considerable addition to the necessary cost in this class of road-building.

Still another very large factor obstructs the probabilities for having the road engineering data, which have been compiled during the past ten years, applied in a simple and direct manner and on a purely financial and mechanical basis, to every projected road improvement enterprise in this broad land. As above referred to, these data relating to the testing out of many and diverse processes for meeting the demand of the age for lasting and dustless roads, converge in their recommendations of coal tar products as indispensable for true economy, with various residues of asphaltic petroleum the only competing materials, except in special localities, as in California, where crude petroleum as such, locally produced and very rich in asphaltum, also competes, or perhaps predominates, owing to a favorable climate.

The question arises at once whether the national production of coal tar is or can be made to equal in quantity the vast amounts which would be required, if the conclusions arrived at by the authorities on road construction in the United States and Europe were to be unanimously accepted and acted upon. Only relatively short stretches of dustless roads have so far been built, mostly suburban in this country, though both France and England have treated or rebuilt a considerable mileage of country roads, largely with special preparations of water-gas tar, but showing a leaning recently in favor of refined coal tars. It is a foregone conclusion that the price of coal tar will rise steadily, if the agitation for dustless roads achieves a true popular success in this country. It seems more than doubtful if a town with gas works will be able to supply the material in sufficient quantity for its own outlying streets and roads, as well as for the other industrial purposes, such as roofing and the production of dyes, for which coal tar is used. And if a positive shortage is bound to result before the dustless road, accomplished by means of

(To be Continued.)

ELGIN GUARANTEES FUND FOR BIG RACE

PROGRESSIVE citizens of Elgin, Ill., have guaranteed a fund of at least \$15,000 to make possible the holding of an automobile road race near Chicago this year. There is strong reason to believe that the event may assume the character of a national stock chassis contest since the Automobile Club of Lowell, Mass., has decided not to hold its authorized event.

M. M. Cloudman, merchant; W. W. Willson, editor and Fred W. Jenks, theatrical manager constituted the committee of Elgin business men who succeeded in securing the promises of financial support from the city of watches and butter and as a result of their success along this line, enthusiasm runs high in Elgin and the Chicago Motor Club is very complacent.

The course that has been discovered near Elgin is an irregular polygon with two long sides and is about eight and a half miles in circumference. Starting at the northeast corner of the course, the route follows the old McQueen road in a generally north-westerly direction and passes over the only hill of any importance about midway between West Elgin and McQueen. This hill is approximately 12 per cent gradient, but is short in length. On the other side, the descent is easier and when the route turns southward, just this side of McQueen, the road level is practically the same as it is at West Elgin. The south leg is short and the turn at Udina brings the contestant around to the east where the road stretches away almost straight and flat as a board as far as West Elgin. South from the course the wonderful, rich Illinois prairie, black and deep with the fatness of the earth, extends as far as the eye can reach. The last leg of the course is northward to the point of beginning.

In some respects the Elgin route possesses more natural advantages than any similar track in the country. There is not a dangerous spot in the eight and a half miles and the turns can

be banked with little effort so that high speed will be possible.

Elgin will donate steam rollers, horses and working apparatus as well as the services of the road supervisors, who have volunteered to take charge of the job. It is estimated that it will cost \$8,500 to put the course in racing shape and the latest reports indicate that at least \$16,500 will be raised. This amount is well over the tentative figures suggested by President David Beecroft of the Chicago Motor Club when he first considered the advantages of the Elgin course.

The discovery of the course is credited to Frank Wood, manager of the Chicago Knox branch and after a careful inspection by the C. M. C. the matter was laid before the business community of Elgin with a suggestion for co-operation. The advantages to the locality were so patent that the movement had instantaneous growth and vigor and the progressive city that "Makes the Whole World Tick" seized upon the opportunity presented.

Definite plans for the initial contest have not been made so far, but as soon as the final word is given, the scope of the plans will be considered in detail. The situation is full of possibilities as the schedule for big racing events about Chicago have been in a doubtful state for some time and more uncertainty looming up for the future.

The new course has excellent transportation facilities. It is only about thirty-eight miles from Chicago and is reached by rail and trolley with practically continuous service. On big race days immense crowds could be easily handled to and from Chicago.

The idea of constructing this course seems to have met spontaneous approval from everybody concerned and all indications so far seem to point to realization of the hopes of motordom.

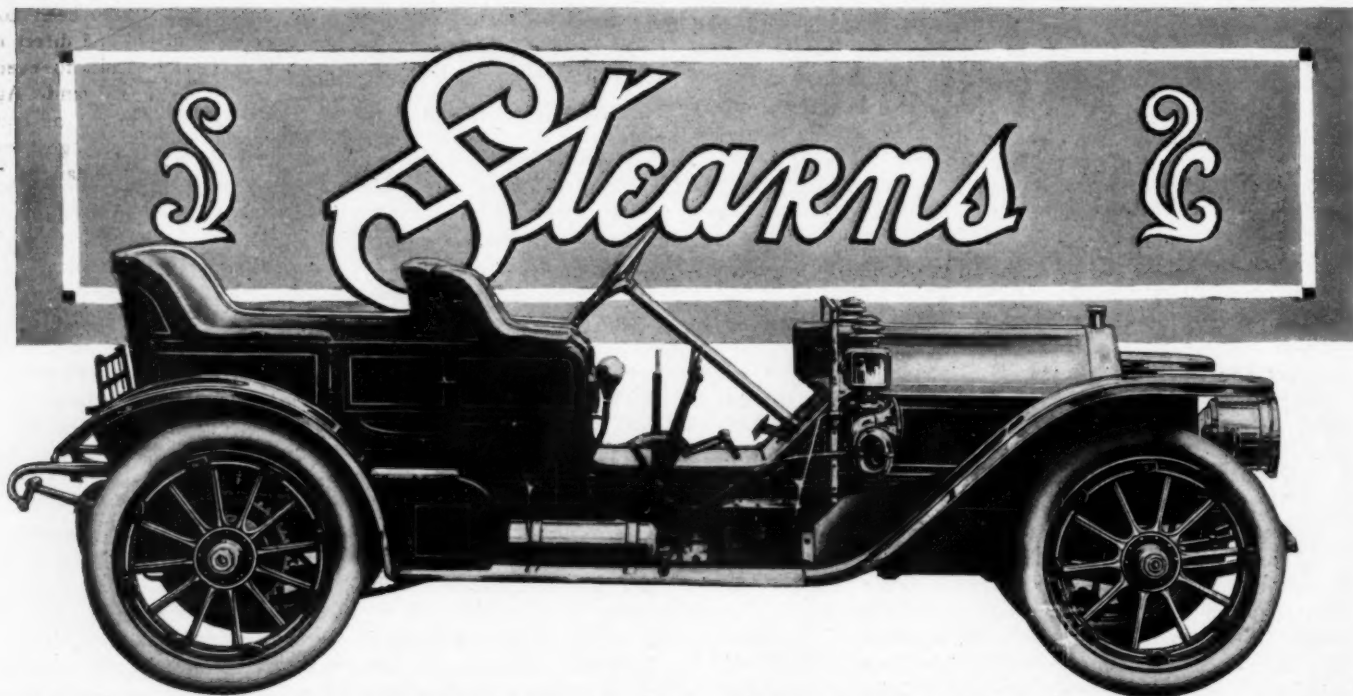


Fig. 1—Stearns 30-60 with a seven-passenger side entrance tonneau of the side chain drive design, showing ample room for the front seats as well as in the tonneau

THIS make of car as produced by the F. B. Stearns Company, Cleveland, Ohio, is offered to discriminating buyers in two models, the smaller of which is known as the 15-30, and the higher powered car is represented as a 30-60. Taking the model 15-30 as the subject for the moment, it may be described with a touring body as a car which seats five and sells for \$3,200. The motor is of the four-cylinder type, with a bore 4 1-2 inches, and a stroke of 4 5-8 inches. The cylinders are of the T type, with the valves located on the left-hand side. The cylinder design is that designated as en bloc, utilizing the four-cycle principle. Lubrication is by splash, with a gear pump which is used for the purpose of maintaining a constant level and circulating the oil on a basis of profuse lubrication. A notable feature of this system lies in the control of the oil supply, which is by means of external leads; they are well designed, stout, and get-at-able. The gear pump is driven by a spiral gear.

Cooling is with water, circulated by a centrifugal pump, util-

izing a cellular type of radiator of neat design for the purpose of absorbing the heat out of the water, and the air circulation is maintained at the desired rate through the use of a six-blade fan which is driven by a belt.

Ignition involves the use of a magneto, and an auxiliary means, the Bosch dual system is employed, and as is well appreciated by users, they are enabled to start with all the facility which is offered by a battery and coil, and to switch over to the magneto with its attending advantages at will. If, in the course of time, the magneto should become deranged, the auxiliary portion of the system is sufficiently complete in itself to serve the purpose. Carburetion is by means of a Stearns design of carbureter, in conjunction with a gasoline tank of ample capacity, and the gasoline flows to the carbureter impelled by pressure in the tank.

Coming down to the most pertinent of the mechanical features, the clutch is of the latest dry plate type, using steel on fireproof fabric, thus affording a soft but positive action,

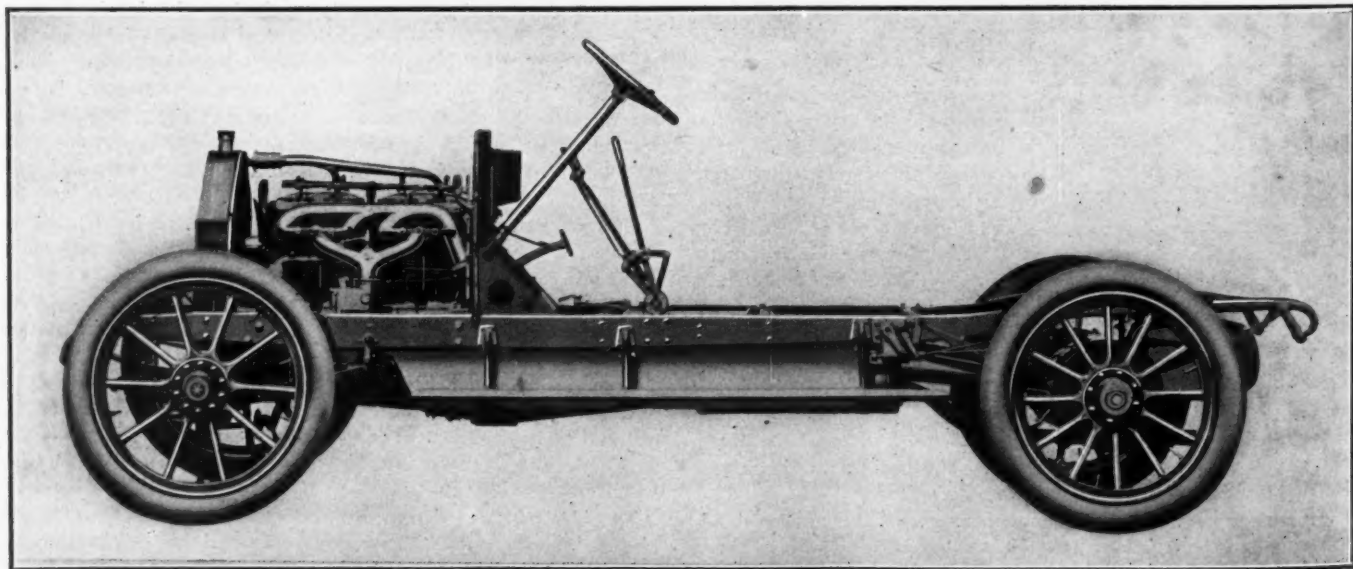


Fig. 2—Model 30-60 chassis, showing half-elliptic spring suspension front and rear, long wheel base, and well designed chassis frame

and other advantages, which were brought to prominence during the last year. From the clutch to the transmission gear the mechanical features are worked out to a nicety, and the gear itself is of the selective sliding type with three forward speeds and reverse. The transmission connects with a shaft drive, utilizing a torsion tube, and the rear axle is of the full floating type.

Bearings are of the anti-friction type at every point of the slightest moment. The crankshaft revolves on annular type ball bearings, of which there are three, and the same may be said of the camshaft, clutch spindle, transmission gear and rear axle. A thrust bearing is used in the clutch. The hub

engineering plane, using alloy steel at every point demanding high ability, and special heats in other grades of steel to induce a proper measure of harmony.

CHARACTERISTICS OF THE 30-60 STEARNS MODEL

This car, fitted with a touring body, with a capacity for seven persons, sells at \$4,600. The motor is a four-cylinder, water-cooled type of the four-cycle genera. The bore of the cylinders is 5 3-8 inches, and it rates with the long-stroke type of design because the stroke is 5 7-8 inches. T-type cylinders are used, with the valves located on the left side, cylinders cast in pairs, and the design is conspicuous for the symmetrical arrangement

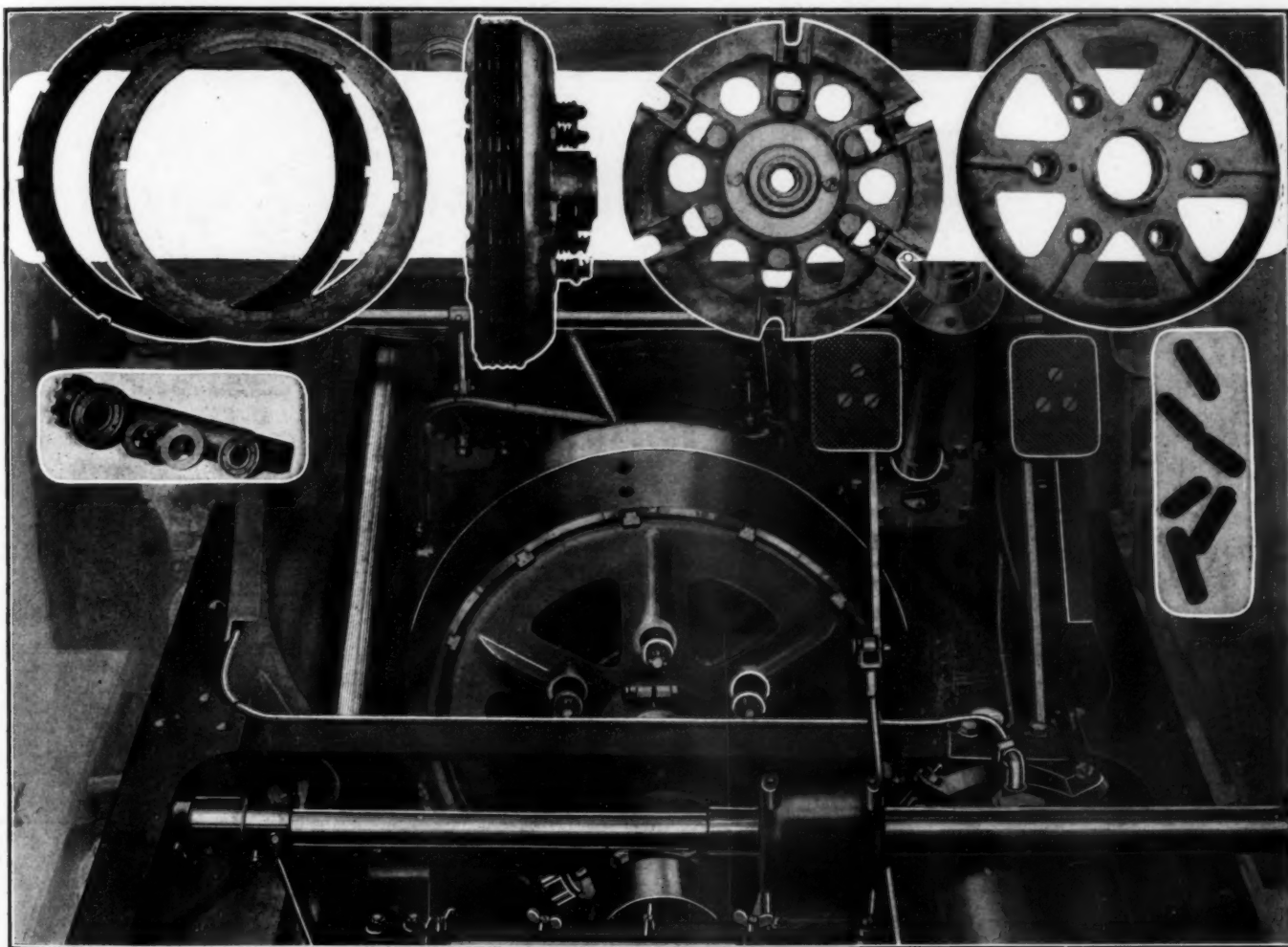


Fig. 3—Details of design and construction of the Stearns dry plate clutch, showing strength and stability throughout

bearings for the front and rear wheels are of the roller type, self-sustaining as to thrust, and capable in the radial plane. Plain bearings are used in the steering knuckles.

The wheelbase of this car is 116 inches, with a 56 1-2-inch tread, and the wheels are fitted with 34 by 4-inch tires front and rear. The suspension of the chassis frame is of the semi-elliptic type of springs in front, they being 2 inches wide and 39 inches between eyes. The rear springs are three-quarter elliptic with 2 1-2-inch plates, and the span is 51 inches.

The front axle is of the I-beam section, forged without welds, and suitably treated to bring out the kinetic properties of the metal. The rear axle is a construction involving a double branch I-section with a differential gear and bevel drive suspended between the bows of the branching members, the idea being to eliminate the troubles which are normal to inferior live rear axles, which are manifest by sagging and disalignment generally. The wheels are fitted with Continental demountable rims, and the construction throughout is on a high

of the components, a certain get-at-ability embodying the idea of quick dissembling in the event it becomes necessary to make an investigation in an extended way for any purpose.

Lubrication is by splash, but the oil level is maintained at the right elevation through the good office of a gear pump, which is driven by a spiral gear, and the oil ducts are externally placed, rigid in their design, and open to inspection at will. The water circulation is by means of a commodious centrifugal pump, which is gear driven, and a thoroughly capable cellular type of radiator, in conjunction with a six-blade belt driven fan, co-operated in the cooling process. A conspicuous feature of the Stearns motor work, which is carried into the cooling system, is the character of the water piping, etc., in which the earmarks of capable coppersmiths may be readily observed.

Ignition is by Bosch magneto, hand controlled, with an auxiliary system of Bosch characteristics. A Stearns carburetor is responsible for the character of the mixture.

A discussion of the pertinent mechanical features of this

model will bring out the use of a dry-plate clutch, with steel on fiber, particularly harmonious details of the control system as pedals, etc., and passing back to the gear-set discloses a four-speed selective sliding gear. It is claimed for this four-speed system that it induces economy in the operation, helps in the accelerating process, and has the virtue of reducing tire depreciation, because by the use of four speeds in a car of this size it is possible to apply the power of the motor progressively and by such graduations that a harmonious relation will obtain between the tractive ability between the point of contact of the wheels and the exertion of the motor.

The transmissions system involves a shaft drive, but at the option of the purchaser side chains are furnished instead. With

elliptical with 2 1-2-inch plates, but the span is 52 inches. The front axle is I-section of a highly kinetic grade of steel, forged in one piece, and suitably treated. The brakes, of which there are service and emergency, are fitted in the rear wheels; the service brakes are worked by a foot-pedal, and the emergency brakes are actuated by means of a side lever. The service brakes are of the contracting design, but the emergency brakes are of the expanding type. The chassis frame is pressed steel of excellent proportions, the further details of which will be rendered at once apparent by glancing at the illustrations here afforded.

GENERAL CHARACTERISTICS OF STEARNS AUTOMOBILES

Carburetion has the virtue of having been used in previous years, and it is claimed by the designer that it has the advantage

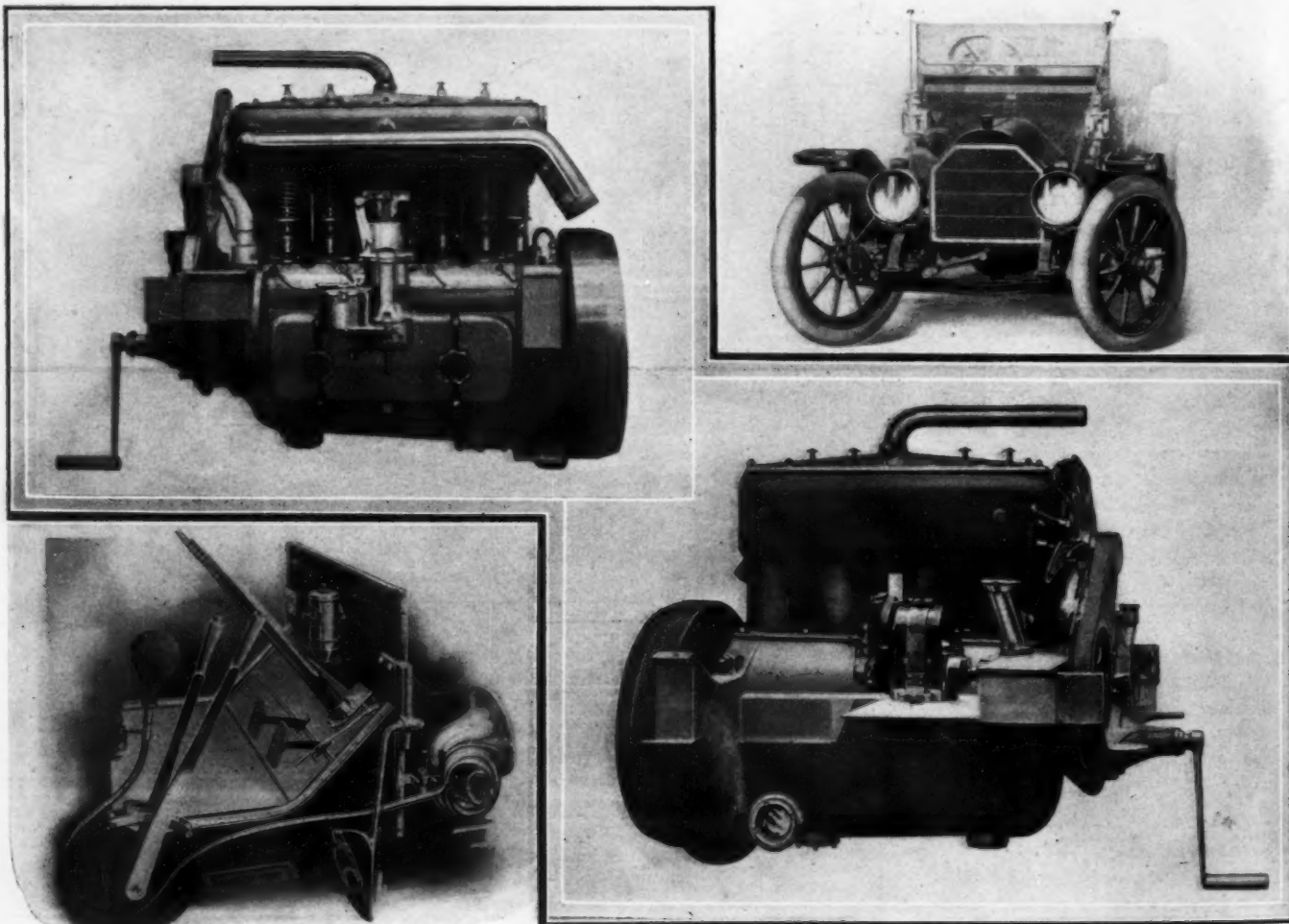


Fig. 4—Two views of the 15-30 motor, showing the carburetor on the left-hand side, and the magneto on the right. Two views of the chassis, one of which presents the characteristic Stearns front and the other depicts a clean dash

a shaft drive a capable torsion tube is employed, whereas if the side-chain drive is selected solid radius rods are responsible for the accuracy of the location of the rear axle. In the shaft-drive type of this model a full floating rear axle is employed.

The crankshaft is equipped with three annular type ball bearings, the camshaft with four, and the clutch spindle gear set and rear axle are also fitted with annular type bearings. It is worthy of note that the thrust of the clutch is taken by a suitable anti-friction bearing. The front wheels are equipped with roller bearings, but the steering knuckles and steering gear have ball bearings. From what has been said, it will be observed that the bearing situation is well in hand.

The wheelbase of this car is 123 inches, with a 56 1-2-inch tread. The wheels are fitted with Continental demountable rims as regular equipment, and the tires are 36 by 4 1-2 inches front and rear. The front springs are semi-elliptic, with 2 1-2-inch plates, and the span is 41 1-2 inches. The rear springs are also semi-

of two carbureters fed from the same float chamber, and actuated by the same throttle lever. It is well appreciated by autoists in general that extreme flexibility is difficult of realization when a single nozzle is employed. The relative sizes of air and gasoline passages are so proportioned that the mixture, considering the power required, is in substantial accord with power variations as they are indicated by road conditions and speed.

There are many points of refinement in relation to the power plant such as might be enlarged upon advantageously, as, for illustration, in the 15-30 the character of the block casting is up to a high standard. It is a perfectly symmetrical shape with a smooth and agreeable exterior, but passing beyond the question of mere appearance, it is to observe that the walls of the casting are uniform, bunching of metal is obviated, shrink holes are not prone to develop, and in the foundry in view of the large top opening, gases are permitted to escape most readily, and wasters are therefore avoided. The top cover being large, permits of

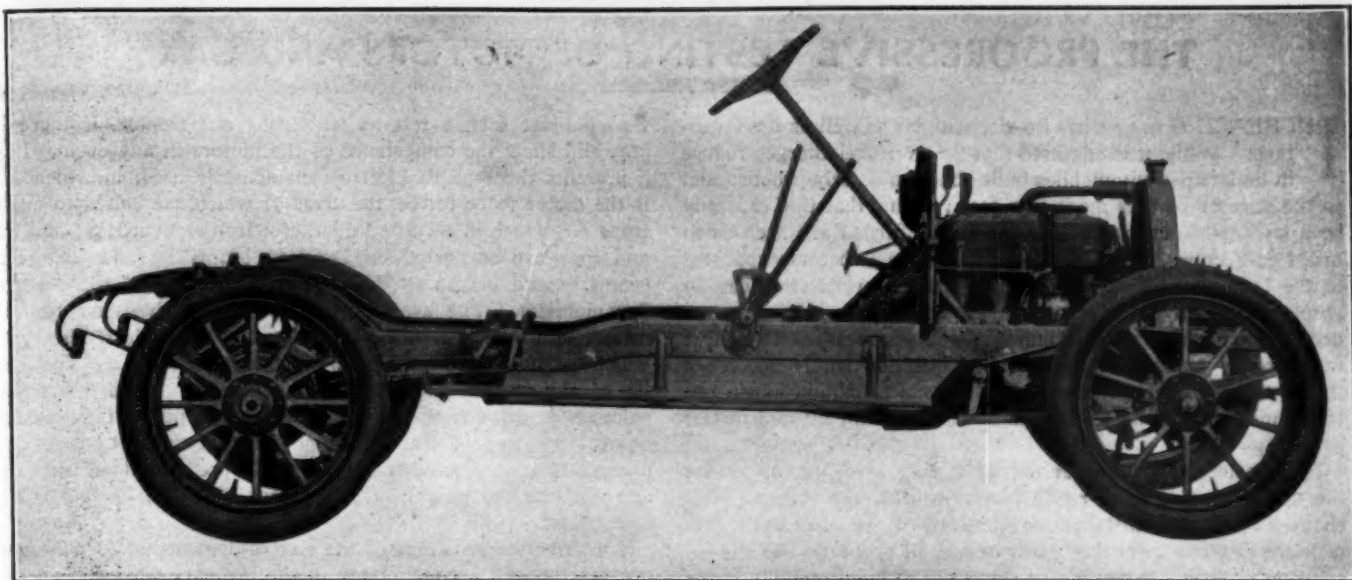


Fig. 5—15-30 chassis with double drop frame, three-quarter elliptic rear, and half elliptic front suspension

getting at the domes of the respective cylinders, and the volume of water available is such that cooling problems do not have to be coped with.

Passing back to the clutch for a moment, it will be observed that the dry plate members are sandwiched between a pair of capable master plates, and pressure is applied by means of six relatively light but live springs. Should the spring pressure be less than that desired by the owner of the car, he is offered the facilities of adjustment of the springs up to the limit of his own personal inclination, but should the springs press harder than the situation demands, the tendency to fierceness in the action of the clutch may be eliminated by the simple expedient of reducing the spring tension. The thicknesses of the clutch members are sufficient to take the torsional effort of the motor, and to accept resistance offered by the car as it negotiates road conditions, without undue surface pressure at the splines, so that the clutch engages and disengages readily, and undue wear on the pressure faces is done away with.

The chassis frame is stoutly braced in a lateral plane, and a cross-bar just back of the clutch is firmly anchored at its ends, and is so designed in point of strength as to present a neat ap-

pearance, evidences of strength, and to take the thrust without backing off so that the movement of the foot pedals is not reduced in effectiveness to the slightest degree.

The general appearance of the Stearns cars is enhanced because of the shape of the chassis frames, and the side entrance in both models is wide, comes well in front of the mudguards, and the height of the running boards is up to standard carriage practice, so that entrance and egress is on the most comfortable basis possible in automobile work. It is in matters of refinement such as this that the company has given much thought, and, considering the excellence of the general design, use of fine materials, character of the workmanship, etc., the reputation of the cars has expanded to excellent proportions.

From the point of view of safety in service, the straight line design of the cross and drag links, considering the quality of material and workmanship used, goes to show that this phase of the problem has been adequately attended to. The steering wheel and the method of its construction lends further promise to safety, and the relation of the driver in the seat to the steering wheel, foot pedals, side levers and other means of manipulation is that which has been found to be natural and efficacious.

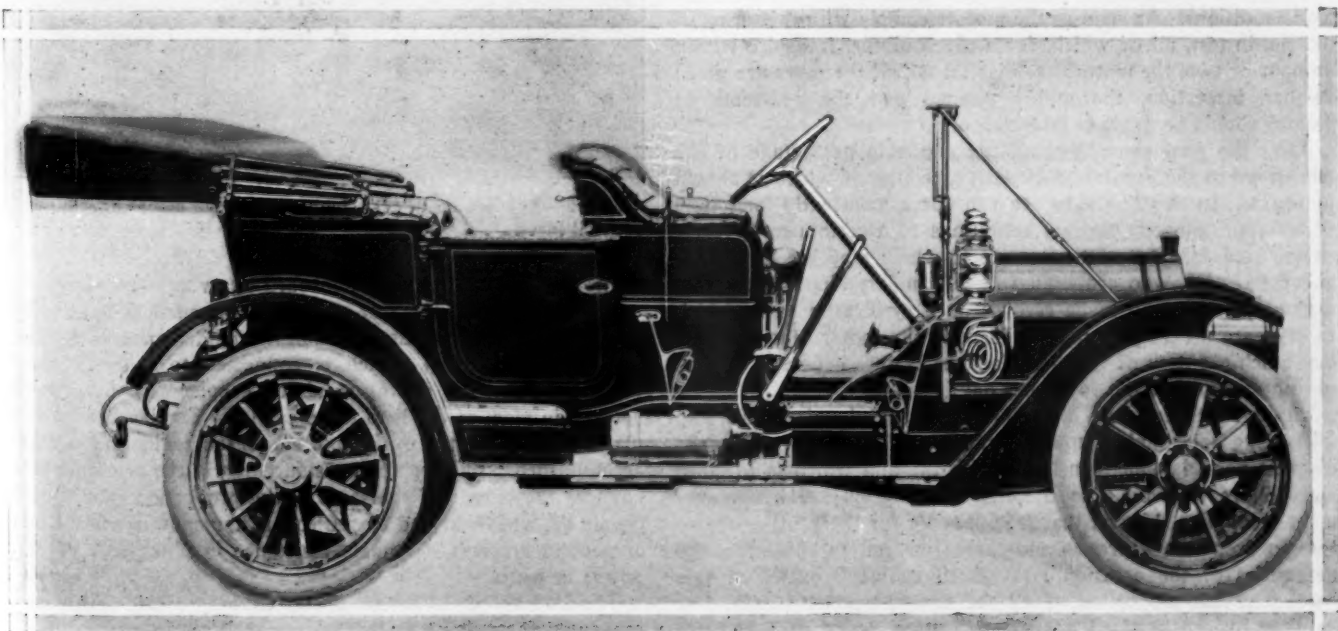


Fig. 6—Stearns model 30-60 presented complete for touring, offering evidences of ability and refinement

THE PROGRESSIVE TESTING OF MOTORS AND CARS

INCREASING output has its vicissitudes as well as its advantages. While it is admitted that the overhead charges reduce in dollars per automobiles built almost inversely proportional to the number of cars made, the fact remains that this can only be a true approximation if the facilities afforded are such as to avoid conjecture during the process. When it became apparent to the builders of automobiles that quantity production was an absolute necessity, not only in order to be able to supply the demand, but with a view to building well at a reasonable cost, it was directly realized that the testing question would become a source of much annoyance, if not a serious stumbling block, unless a means could be found which would permit makers to test as they go along.

It is useless to try to get out of testing every motor made; the necessity of testing really increases with the output. The chances of making mistakes are relatively slight when but a few men are employed, but they grow out of all proportion to the increasing product. When a man starts out to build one motor for use in say one automobile he no sooner completes the mechanical task than he busies himself in a prolonged and exacting test to ascertain the extent of his success. When the same man undertakes to build 1,000 such motors, he becomes enmeshed in a mass of intricate details, and if his caliber is inconsistent with the proportion of the undertaking, it is easy enough for him to conclude that further testing is inconsequential, and he abandons himself and his product to the uncertainties of fate.

The builders of automobiles of the class who succeed fully understand that if they fail to master the great task it will master them. It is a great task to test a large number of motors every day, and the only way it can be accomplished is to contrive a means at whatever cost of time, ingenuity and money. In the plant of the Regal Motor Car Company, Detroit, Mich., the problem has been coped with successfully and fortunately, and as it is the purpose here to show, the scheme employed has the merit of being simple as well as reliable.

When the motors are assembled, after the parts are completed, inspected and accepted, they are transferred to the initial test department, a section of which is shown in Fig. 1, where they are given a run-in test. In this undertaking the motors are operated under conditions of profuse lubrication, and they are given a critical inspection in divers ways, the idea being to note that they are complete and likely to survive in a more extended test under load conditions. As soon as the motors comply with the terms of the run-in test, all of which, for a given motor, transpire within an hour or two, the motors are disassembled, all the parts are given further inspection, thoroughly cleaned and the reassembling (which should be final) is undertaken.

After the final assembling all but a certain percentage of the motors go to the regular block test, a section of which is shown in Fig. 2. In this test they are run for a sufficiently long time under approximately normal conditions to ascertain as to their competence, in view of the service to which they are to be put, and the testers, who are skilled in this undertaking, go through a fixed formula and make records on a systematic basis, which records are properly numbered, identify the motors for all time, and reach the desk of General Manager Haines before 10 o'clock on the morning of the following day.

Throughout the plant everything moves in hundred lots, the idea being to complete 100 automobiles in each lot within the shortest possible time, consistent with the aim which is to build automobiles to live up to the Regal reputation. The management recognizes the fact that it is possible for the routine operators to drop into a groove and thereafter fail to appreciate the necessities of the occasion. To guard against troubles of this sort, a certain proportion of all the motors made are picked at random by the head of a separate testing department and are taken away to the electro-dynamometer room where they are put

through just such a test as will bring out trouble, if there is any, and show the competence of the motors in any event. Fig. 3 presents the type of electro-dynamometer used, in which M_1 is the motor to be tested, the arms of which are bolted to angle irons A_1 , which in turn rest upon cast iron standards S_1 and S_2 , and they are supported by I-section beams B_1 and B_2 . The beams extend across to the cradle C_1 and C_2 of the electro-dynamometer. The armature of the electro-dynamometer A_1 rotates on its spindle, which is centered in the outboard bearings which extend up from the cradle members C_1 and C_2 . The field F_1 of the electro-dynamometer has inverted radially disposed poles upon which windings W_1 (multipolar type) to the required number of ampere turns arranged for separate exciting are placed. The arm A_2 extends out for a predetermined distance, and supports the weight W_2 , by means of which loading is accomplished.

The armature windings of the electro-dynamometer connect to brushes through a commutator in the ordinary way, and an ex-

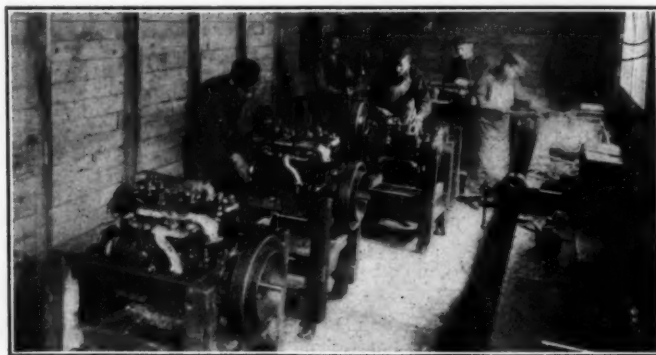


Fig. 1.—Preliminary run-in test under conditions of profuse lubrication, made for the purpose of ascertaining general competence of the motors.

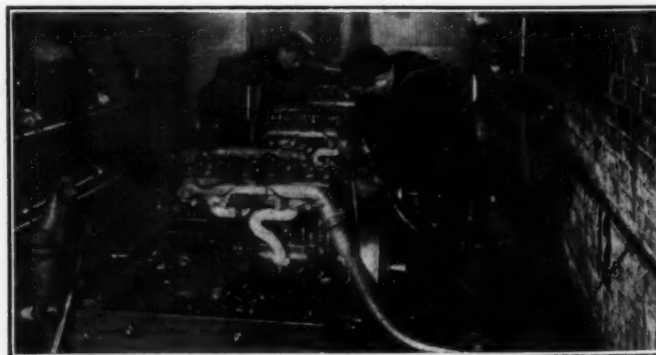


Fig. 2.—Regular block test, made under the most exacting conditions, during which time the motors are tuned up and put into serviceable condition.

ternal circuit runs to the switchboard S_3 , where the switches, instruments and field rheostat are placed. Resistance is introduced into the armature circuits according to the demands, by means of a water-rheostat W_3 , which is connected to a switch on the switchboard by the use of insulated copper wire of a suitable section, in view of the load to be carried. Varying the resistance of the field alters the excitation, and speed regulation is thereby accomplished. Varying the resistance W_3 in the armature circuit changes the output of the same in the proportion of $I^2 R$ equals W , which divided by 746 equals horsepower when I equals current in amperes, R equals resistance in ohms and W equals power in watts.

The field F_1 of the dynamometer tends to rotate and it is only prevented from doing so by the weight W_1 . In ascertaining the power of the motor M_1 , it is brought up to the desired speed,

measuring the same by tachometer, and the weight W_1 is increased or decreased as the occasion requires, until the arm A_2 assumes a horizontal position, when the power of the motor M_1 is at its maximum for the given speed, provided the weight W_1 is all that the arm will bear and remain in a horizontal position.

There are two ways of determining the power of the motor M_1 . If the electro-dynamometer is calibrated, and its internal losses are thereby ascertained, the power will be proportional to the electrical output multiplied by the percentage of efficiency in which W equals E multiplied by I , when W equals the output of the armature of the electro-dynamometer in watts, E equals the potential difference across the terminals thereof in volts, and I equals the current in amperes from the armature, and this may be reduced to horsepower by dividing by 746.

The excellence of the electro-dynamometer is thoroughly well established. Its accuracy may be measured to within a fraction of 1 per cent., and its flexibility is such that the testers, who have great skill in this connection, are enabled to investigate a goodly number of motors within a relatively short time.

After the motors are completed and tested, and assuming that the check test on the electro-dynamometer accords with the

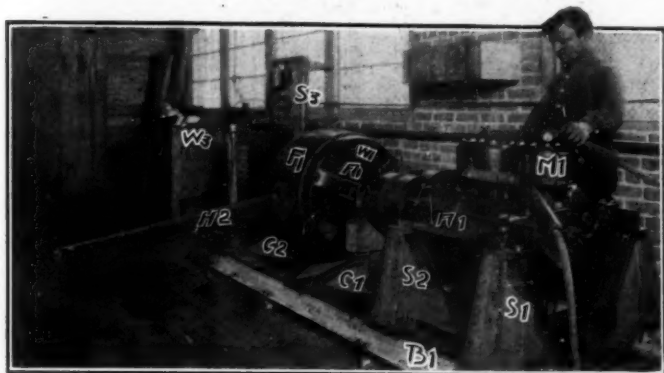


Fig. 3.—Electro-dynamometer, which is used in the check test of a certain percentage of the motors, they being taken at random

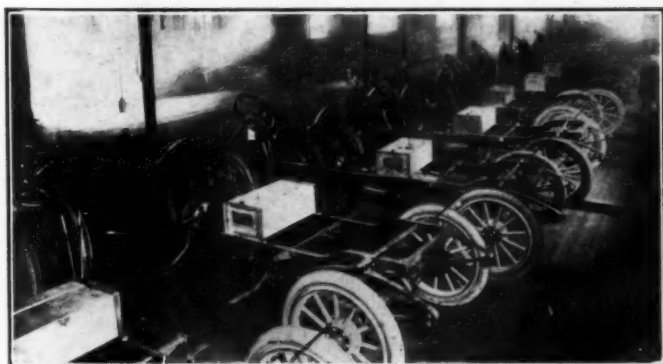


Fig. 4.—Chassis test which is made on every chassis completed before the cars are put upon the track for their final test

desires of the general manager, they are assembled into the chassis, and Fig. 4 depicts the next proceeding. The chassis are run into an iron house, after which they are jacked up at the rear, the motors are cranked and the cars are thus given a running test. All cars so tested that prove to be noiseless and satisfactory in general are taken out of the chassis test department, put onto a track on the company's property, and run by a chauffeur whose duty it is to carefully note the extent of satisfactory performance, and report in writing just what he finds, the character of which, in his judgment, is inharmonious. The whole idea, from start to finish, is to test out the parts and the products progressively and in step; to be able to determine deviations from a fixed standard before it is discommodingly late, and to correct evils so quickly and efficaciously that each hundred lot of cars will come through on time.

SPECIFIC INSTRUCTIONS PRODUCE RESULTS

BY O. G. A.

OF the devious ways of country garage men with the innocent motorist, the stories seem to be without end. A New Jersey owner was telling his experience the other day.

"When I got my little 4-cylinder runabout," he said, "I was about as green as they make 'em. I had no particular trouble with the car, except that my batteries were everlastingly giving out. I didn't know then what the matter was; I simply ran into Smith's garage and asked him to fix the engine up so it would run. He'd fix it up, all right, and it would run beautifully. I would take the car out, and in a day or two it would begin to miss. I learned to expect trouble as soon as the missing began, and to head for home; but many a time I was hung up on the road, miles from anywhere. The engine would run a little, a few hundred yards, and then quit. When I was tired cranking I would rest. I didn't know it, of course, but I was giving the battery a chance to rest, too. Presently I would turn the crank and the engine would start, and I would run for a mile or so and repeat the performance.

"When I got the car to Smith's I would ask him what ailed it, and he would say that he would have to look it over. I would leave it there, and in a couple of days he would report that the valves needed grinding or some other fool thing, and I would pay him \$10 or so for his trouble. Of course all he did was to put in new batteries, half-dead ones at that.

"One day I left Smith and started for a town six miles away, where the nearest agency of my car was located. I was three hours getting there! The same old performance took place, and I am afraid to say how many times I objurgated that car. When I reached the agency all the mechanics were out, leaving only a boy in charge of the place. My battery was so far spent that he had to help me push the car into the garage. As the men were out I thought I should have to wait, but the boy ventured respectfully to assert that he could fix me up. I asked him if he knew what the matter was, and he said 'No, but that he could soon find out.' In the end I let him go ahead. I didn't watch him, but in ten minutes he had that engine running as well as I had ever heard it. I asked him the charge, and he said, 'Two dollars.' I asked what for, and he said, 'One dollar and fifty cents for new batteries, and fifty cents for my time.' I paid it, thanked him, and then asked how soon I would probably be in trouble again. He climbed into the seat and felt of the coil tremblers. Then he said, 'These batteries will run you about seventy miles; in a minute I will fix them so they will run you three hundred.' I watched him then, and all he did was to slacken the tension of the contact screws on the tremblers! That rascal, Smith, not content with selling me dead batteries at \$10 or \$12 per set, had screwed down the contacts so they would eat up what little current was left as fast as possible. I went my way in the glow of a great light.

"A few days later I stopped at Smith's for gasoline. He asked casually, 'How's your car running?' 'Splendid,' I said. 'I thought so,' said Smith, cheerfully. 'I knew the last time I fixed you up that it would run all right.' 'Smith,' I said, 'do you know how long it took me to get to town after I left you that day? Well, it took me three hours. It wasn't you that fixed me up; it was a fellow at the agency in town.'

"Smith looked at me in a queer sort of way, and asked, 'What did he do?' 'Nothing in the world,' I told him, 'except to put in good batteries and slacken the tension on the tremblers.' At that Smith turned on his heel suddenly and walked away. But as he did so he flung back the remark over his shoulder, 'I guess I shan't get any more easy money out of you!'

"Well, he didn't, for from that day to this I have never left my car in Smith's garage or any other without giving explicit instructions as to what I wanted done, standing by to see it done, and then taking the car out immediately when it was ready to run. In all, my experience with Smith cost me \$58, but I know now that it was money well spent for education."

Pertinent Features of Abbott-Detroit Car

THIS year is the one of conspicuous company efforts in the automobile line, and visiting the plants of the respective companies discloses a wide variation in the methods employed by them respectively, each one being a study in itself. In the Abbott-Detroit plant, of the Abbott Manufacturing Company, the car which is being turned out sells for \$1,500, and with a touring body, seats five persons. The method involved in the manufacture, if such it might be called, is entitled to even greater mention than the product itself, because of its excellence, but as might be expected, excellence of the method employed is reflected favorably in the product.

In this establishment a unit system of production obtains throughout; the materials come in through the receiving door, are sorted into their respective generic types, and pass on to the preliminary testing room wherein they are carefully inspected and counted. If some of the materials fall below the exacting standard set by the company for its inspectors, they are moved to the right into a room wherein doubtful products await the action of the production manager, whose power of final decision enables him to promptly approve of the inspectors' marks, and return the materials from whence they came. The good materials pass on to the general storeroom, and are there sorted out in such a way that they may go into the shop in assembly boxes, each box holding the requisite number of pieces or parts, and such materials in the rough as may be required to satisfy an assembly order.

In the shop, at every point, the same idea obtains throughout the work. "Schools" of materials advance from one stage to another, until in the course of events the units which compose the automobiles are assembled, inspected, and then pass on to the testing department, wherein competence is proven, or defects uncovered. Should an assembly unit fall below the established standard during test, it is sent back to the department responsible for the inferior work, is disassembled, and the parts are then re-inspected, during which time the trouble is definitely located, responsibility is centered on the individual who may have disregarded the requirements, the parts which do not conform to the needs are cast out, and after re-assembling the unit is again returned to the testing room, with the expectation that it will come up to the chief tester's requirement.

This method of grouping materials has a wide influence on

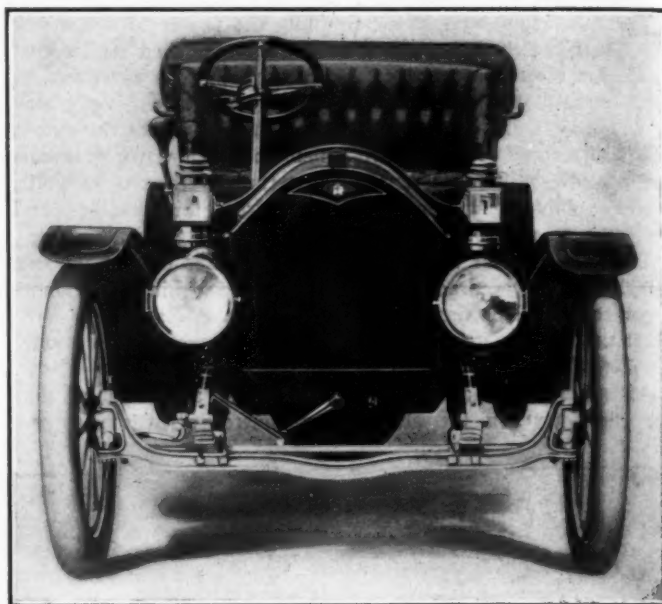


Fig. 1—Looking at the front of the car showing I-section drop axle, protected cross-rod and drag link

the product of the plant, and the cost thereof. In the average shop, much time is wasted by the workmen, who, when they are instructed to proceed with a shop order, must first look up the material list, determine the character and quantity of materials required, and then stand in line in front of the store room distributing window awaiting their turn, always with the opportunity to kill a considerable amount of time, which they do pleasantly enough, since they have company, and the environment is ripe for unprofitable discussion. By means of tote boxes, in which the materials for a given job are placed and checked off by the store-keeper long before they are required by the respective workman, all delays as above indicated are done away with.

GENERAL CHARACTERISTICS OF THE ABBOTT-DETROIT CAR

The motor is of the 4-cylinder water-cooled type, with a bore of 4 inches and a stroke of 4 1-2 inches. The cylinders are

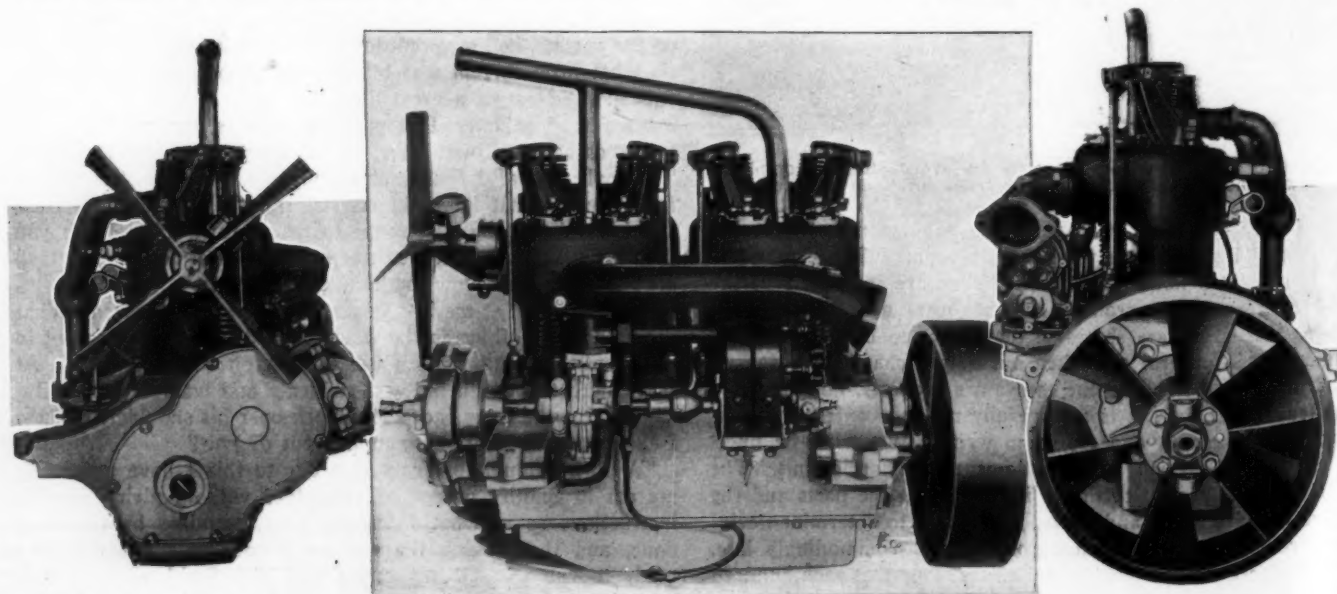


Fig. 2—Three views of the motor showing pump and magneto on one side, and a fan in the flywheel

cast in pairs of gray iron, and the motor is normally rated at 26.5-horsepower. The valves are located with the inlet on top, and the exhaust on the side, and the timing is that which obtains in satisfaction of the 4-cycle principle. The general appearance of the power plant is shown in Fig. 2, with three views, the one on the left being the front end of the motor, indicating how the half-time gears are completely encased; the middle view presents the left side of the motor, and indicates the manner in which the water pump and magneto are driven by an extension shaft which passes out from the half-time case, back through the water pump, thence to an Oldham joint, beyond which the magneto is placed on a shelf which projects out from the top half of the crankcase. At the right, the rear of the motor is shown; the flywheel is of large diameter, and the spokes form fan blades, which exhaust the air from the hood, whereas air is pulled through the radiator by a fan in front. The water cooling, in view of the use of a commodious centrifugal pump, a fan in the flywheel and one in front, is most thoroughly accomplished, and the performance of the motor reflects the completeness of this system.

The valve system, and the method of its application, will be best appreciated by referring to Fig. 3, which is a view of the two pairs of cylinders looking down from above, with two of

The pump takes its power from the camshaft, and the oil is circulated by pressure to whatever extent positiveness is necessary and by gravity for the rest. Fig. 4 shows a section of the crankcase in the region of the half-time gears, and a close examination thereof will indicate quite readily how profusely lubrication is induced, but additional sections would have to be used to more clearly indicate the means at hand for draining the used oil away from the bearings, thus permitting a fresh supply to supplant it continuously.

While attention is riveted on Fig. 4, it will be timely to call attention to the camshaft which has one very large end bearing at the gear end, a relatively large bearing at the opposite end, and two intermediate bearings proportioned for their responsibilities. The cams are cut integral, and attention is called to the design of the lift, which is in two parts, one part of which, with its mushroom, engages the cam, and the other part engages the rocker-rod stem. An intervening spring presses between the two engaging members, and the result is that noise, due to lost motion is aborted. An adjustment is provided, whereby it is possible to re-establish the timing of the valves quickly and readily should the occasion require. Ignition is by jump spark, utilizing what is known as the dual system, involving a magneto in the main, and a coil and

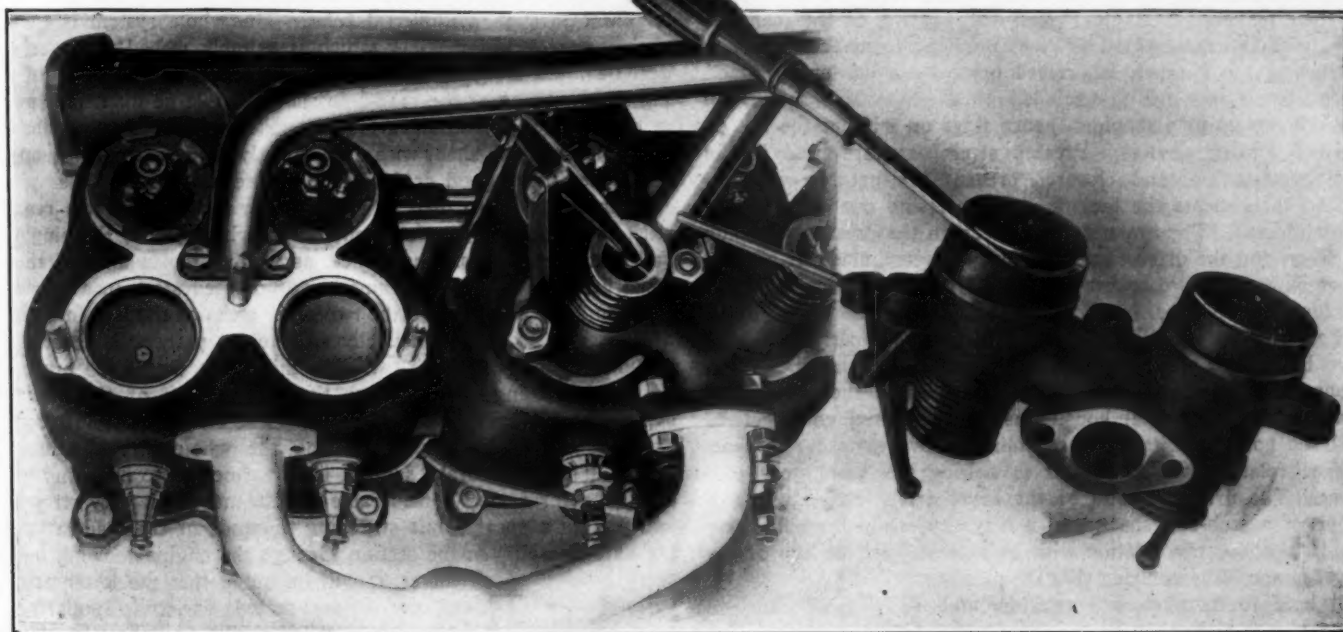


Fig. 3—Looking down on the motor presenting details of valves in the head with one pair removed and presented at the right

the valve cages removed from the cylinders at the left, which cages show, as the figure at the right, with a screwdriver so placed that it pries one of the valves off of its seat against the pressure of the valve spring. Obviously, it is a simple expedient to remove a pair of valves with their cages complete from the cylinders, for the purpose of grinding, or in the process of inspection, and the design is so carefully worked out, that the inequalities, due to heat changes, have no ill effect on the service rendered, because the cages fetch up against flat seats, with a clearance in the radial plane, and the joints are ground. The valve springs are of suitable proportions to afford the desired pressure, but the design thereof is such that the springs are alive, and the angular rotation of the camshaft is reduced to the minimum, during the period of closing of a valve under the action of the spring. Matters such as this add materially to the power and smooth-running qualities of the motor, and make it possible to adjust the timing for the best result.

Lubrication is by splash with a pump which is located outside, hence open to inspection at will, and it affords the additional advantage of being readily removed for the purpose of repair.

battery for auxiliary work, with a hand control. Splitdorf magneto is the regular equipment. Carburetion is accomplished with a Mayer carbureter, and the fuel is fed from a tank of suitable proportions, by gravity.

In further recognition of the mechanical makeup of the car, attention may be called to a multiple disc clutch with steel on steel, and a sliding-gear system of the selective type, located amidships. This gear has three forward speeds and reverse. It is related to a shaft drive through suitably disposed universal joints, terminating in a floating type of rear axle, with the reactions satisfied by means of a well-designed torsion rod.

The bearings in this model comprise three, which are plain in the crankshaft of the motor; the camshaft bearings are plain also. F & S ball bearings are used in the road wheels and rear axle system, excepting for the front wheels, which have Timken roller bearings. The plain bearings used in the car are lined with Parsons white metal.

The wheelbase of this model is 110 inches, with a 56-inch tread, and the wheels are fitted with 34 by 3 1-2-inch tires front and rear. The spring suspension of the chassis is semi-elliptic front and three-quarter elliptic rear. The front axle is of the

AERONAUTIC PROGRESS ALONG CONSTRUCTIVE LINES

By MARIUS C. KRARUP

STEERING devices, rudders and keels are among the elements of construction which engage most attention among aviators at present, but what is most important with regard to their mechanical action, in combination with the most successful aeroplanes of to-day, is likely to be found of little consequence, as soon as improved planes, propellers and motors make their appearance. Only the fundamental principles of these elements will then be of interest. But for a number of years to come the tilt-rudder usually in front of the biplane and the vertical rudder usually to the rear, as well as the corresponding members in monoplanes, must be reckoned with, somewhat as hot tube ignition and "hit-and-miss" motor speed had to be studied for years in the automobile industry, until improved carbureters and progress along the whole line made throttle control and the magneto practicable. Learned discussions on the relative merits of governing "on the intake" or "on the exhaust" are now remembered with a smile. And at all times some of the constructors knew that those expedients could only be temporary makeshifts; yet, they had to be employed.

In the art of aviation, soon to be an industry, much of the progress which is theoretically in sight must probably await the advent of suitable construction materials in suitable shapes, combining strength, lightness and elasticity in a degree which can never be developed in a wood-and-canvas structure. The makers of fine alloy steels have here an open field for experimental work, relating to the economical production of thin structural shapes, most of them elongated and tapered, others in the form of joints and clamps, and all of them uniformly heat-treated at the producing plant and preferably made from a single, standardized "aviator's alloy," highly dependable, and whose strength in any given size and shape may be calculated to a nicety. While the pressed-steel frame, and the processes which made it possible, proved highly adventitious to the automobile industry, the production of aeronautic steel lumber, adaptable to experimental construction, would seem to be outright indispensable for substantial progress in aviation, as the constructor must be released from bondage to unreliable woods, especially weak and bulky in the joints, before he can get elbow room and begin to materialize his ideas. The latter may be faulty or correct, but as a rule they will be "between and betwixt," and will require demonstration before their worth can be decided. But while the evolution of special aeronautic construction materials is foreshadowed and necessary, it will require time, and during the years which must pass before such materials are likely to be available, the design of the thousands of aeroplanes to be built must probably include tilt rudders, steering rudders and such slight warping of planes for steering purposes as wood construction admits.

Mere keels, unadjustable and inapplicable to any kinetic purpose, are already passing into the realm of superstitions or preconceived notions, as it has become perfectly plain that they are just as much of a hindrance to the regaining of equilibrium as a help in preserving it. As their alleged utility has never been founded on theory, it need not be theoretically gainsaid. Their use has mainly served as a reminder of something faulty in other parts of the construction. The seesawing of the main planes, which they were intended to prevent, was a symptom partly of overconcentration of weight along the axis of the machine and partly of shiftiness in the support afforded by the planes, and the logical remedy has been found, by those constructors who use no keel, in better distribution of weights, the use of more strongly curved planes, whose support is less variable from accidental influences than that derived from planes of small curvature, and in the manipulation of vertical rudders. But weight distribution has not yet been found feasible for monoplanes, and here the remedy taking the place of stabilizing keels is the adoption of the dihedral angle, so-called, in con-

junction with a low center of gravity, as in Latham's well-known machine.

The principle at stake is that of mobility versus inertia, for preserving equilibrium. In favorable weather the inertia elements, whether keels, vertical or horizontal, or tails, produce the steadier flight, perhaps, but in irregular weather the mobility principle wins out. The main question in this respect is clear: Should air resistances, which are not subject to graduated control, be employed as means for controlling equilibrium, when air currents are the disturbing element to be guarded against? The analogy drawn from the steadying effect of the keel of a ship loses all force, when it is considered that the ship's keel is not itself exposed to the action of either waves or winds, which are the disturbing factors in navigation. In aviation, keels are not to be.

The tails of monoplanes combine two elements of inertia, one derived from the trailing weight, which at present serves the double purpose of keeping the machine head on, so long as the motor and propeller work, and of suppressing irregularities in the tilt and support of the planes, and the other consisting in the air-resistances which oppose any rapid displacement of their extended surfaces, except in the line of motion of the machine. These two elements of inertia in conjunction destroy the advantages which the monoplane should intrinsically possess in the way of superior speed, due to the smaller air resistance against propulsion of its single plane, and explain why it has not been able to maintain this supposed speed-superiority in contests.

In the biplanes, some lack of uniformity in the support afforded by the planes is acknowledged in the considerable distance from the front edge of the main planes, at which it has been necessary to place the tilt-rudder. As the tilt-rudder is small in comparison with the main planes, it must be made to act with great leverage against any tendency which the main planes may develop toward pitching forward or backward. This tendency, with properly curved and narrow planes, should not be very pronounced. Even a somewhat irregular wind will usually drive the whole aeroplane machine before it rather than raising or lowering any part of it, similarly as the housefly is saved from a clumsy pursuing hand by the air current preceding the attack. But safety against the exceptions to this rule is vital, and the tilt-rudder is intended to supply it. And, while every biplane is supposed to be so balanced by its designer that its weight is distributed evenly on both sides of its axis, and also to the front and rear of a line which may be drawn parallel with the front edge of the planes and, roughly speaking, about one foot behind this edge, the corresponding line indicating the transverse axis of aerial support does not stay in one place, but shifts forward with an increase of speed and backward with an increase of load, and the tilt-rudder is relied upon to take care of these changes in the fore-and-aft balance of the machine, through proper manipulation. At high speed, the tilt-rudder is desired to cut the air quite edgewise, no forward lifting action being required of it. But, if the machine is intended to be used mainly at some lower speed, the size and distance of the tilt-rudder from the main planes should be so adjusted that it will cut the air edgewise at that particular speed, because this arrangement will give a maximum range of effective rudder action for control and safety, namely, 20 degrees of deviation on both sides of the direction of motion. It has been experimentally demonstrated that rudders of present construction reach their maximum effect at that deviation, so that nothing is gained by turning them farther. Fortunately, the nice balancing of the whole machine involved in procuring these results may be obtained experimentally not only by adjustments of the area or leverage of the tilt-rudder, but also by moving the

(To be continued)



Through Swamp and Desert to Pacific

AFTER fighting four days in the teeth of a driving sandstorm, Walter H. Hanson and his transcontinental touring party recently swung into the frontier town of Mecca, on the edge of the great desert, tired from the battle with the elements but happy in the unusual accomplishment. The dust and sand had penetrated to the depths of their beams, but the car, a seven-passenger Stearns, weathered the gale in good style. From Mecca to Los Angeles the tour was pleasanter, although the roads were terribly rough. Mr. Hanson, who is a wealthy broker of Saratoga Springs, N. Y., his wife, son and chauffeur appeared to have enjoyed even the more strenuous of the incidents of the trip from ocean to ocean.

They were mired in Louisiana, mobbed in one of the swamp parishes, traversed some of the most forbidding trails of the country, but arrived at their destination in good health and spirits.

"We made Phoenix all right," declared Mr. Hanson upon his arrival at San Francisco, "and there we picked up George Duke, who acted as our guide through to Los Angeles. Of course even Mrs. Hanson had become hardened to the bad roads of the South and the jolting didn't bother us much. We reached the Colorado River all right and were ferried across by the Indians and pulled out of Ehrenburg Thursday morning expecting that with ordinary luck we would reach Mecca that night.

"The sandstorm on the desert was something indescribable. While it was an extremely trying experience insofar as our eyes were concerned, I enjoyed it to a certain extent. The wind blew the sand so that one could not see 20 feet ahead. The sand was

deep and fine as powder, making it a hard matter to hold straight the big car with its 6,000 pounds of weight. Sometimes we could see the tracks of a wagon which had gone ahead, and sometimes the road looked just like any other part of the desert. We didn't get lost, but I can easily imagine how an automobile could lose its bearings going over the stretch of country between Mecca and Ehrenburg.

"But when you strike the civilized portion of California, then you begin to realize what a paradise it is. Outside of a few roads in New Jersey, I don't know of a State that can boast of such good, ordinary highways as southern California. Talk about your bad roads, why California highways are as asphalt pavements beside them!

"Down in Louisiana we were held up one night by a band of ruffians who declared that we could not pass. I turned around; went back to the nearest town, got the deputy sheriff out of bed and then, he standing on one running board and I on the other with gun in hand, forced our way through this terrorist mob."

The run from Mecca to Los Angeles, a distance of 154 miles over some of the worst roads in the southern part of the State, was made yesterday with the son at the wheel. The transcontinental party was met near Pomona by a party of newspaper men, who piloted them into the city. On the return into the city, the local car was left behind by young Walter Hanson, who came flying over an unknown road faster than most road racers would want to take it.

At present the Hansons are touring in California and are not sure when they will return to the East.



Figures and Deductions From 1909 Exports and Imports

IN the yearly summary of the foreign commerce of the United States, the figures interesting to automobilists would seem to have been carefully buried under a subdivision of comparatively small moment, that is to say, in classifying automobiles and their parts under the heading of "Carriages, Other Vehicles and Parts of," the Bureau of Statistics of the Department of Commerce and Labor seems to have given the lead to the insignificant part. In short when the division is called "Carriages," when carriages amount to but 1 per cent. of the total, while automobiles and parts consist of the other 99 per cent., it really seems like a case of the tail wagging the dog. It is time that the automobile manufacturers rose in their might and had this changed.

Getting right down to the figures, some very interesting facts are there brought out. Thus, in the summary of commerce with non-contiguous countries, the fact appears that our trade with the Philippines and Porto Rico has dropped off, while with Hawaii, on the other hand, such a big increase is noted as to nullify the other two losses.

SHIPMENTS OF CARS, CARRIAGES, AND PARTS TO PORTO RICO, ETC.

Year.	Porto Rico.	Philippines.	Hawaii.
1907	\$615,720	\$165,359	\$329,711
1908	563,829	261,628	452,040
1909	548,509	129,995	707,540
Change Over 1908	— \$15,320	— \$131,633	+ \$255,500

From the above, it would appear as if the automobile manufacturers had not given enough attention to the Philippines or Porto Rico, to their own loss.

As a concrete expression of the business done by American manufacturers, the summaries of total exports and imports are of much interest, although the previously mentioned combination with carriages and carriage parts somewhat beclouds the exact facts. At any rate the constant increase and its changing each year will be given thus:

VARIATION IN TOTAL EXPORTS OF CARRIAGES, ETC.

Year.	Value.	Net Change for Year	Change in Per cent.
1903	\$10,499,195		
1904	10,936,618	+ \$437,423	+ 4.16
1905	10,610,437	— 326,181	— 2.93
1906	17,788,425	+ 7,177,988	+ 67.6
1907	20,513,407	+ 2,724,982	+ 15.3
1908	22,072,902	+ 1,559,495	+ 7.56
1909	15,392,817	— 6,680,085	— 30.2

Probably the most noticeable and also the most surprising thing in the above table is the radical falling off of the business during 1909, as compared with 1908, which latter is not thought of as a good year, at least not particularly so in the automobile business.

Geographical distribution is valuable when tabulated, for the reason that a country taking a big percentage of present exports should be a good field for a maker just starting in to export, rather than virgin territory. In the Government summaries the grouping is very general, there being but six grand divisions, the exports to which for 1909 were:

DISTRIBUTION OF EXPORTS BY GRAND DIVISIONS

Division	Amount	Percentage of Whole
North America	\$6,485,742	42.10
Europe	4,229,802	27.50
South America	3,084,187	20.10
Oceania	857,126	5.55
Asia	527,579	3.42
Africa	208,381	1.34
Total	\$15,392,817	100.01

In this table the surprising thing is not the amount of trade with North America (Canada and Mexico), but that with South American, Oceania and Asia, these latter three, which the ordinary man would say were negligible, amounting, when added, to no less than 30 per cent., or, in round figures, one-third. All things considered, it would appear as if this part of the world offers the greatest future of all, the untold numbers of people in Asia being an immense field as soon as they can be educated to the benefits of the automobile. Taking China alone

as an instance, with its population of 410,000,000, Japan with 45,000,000, Persia with 8,000,000, Siam with 6,000,000, to say nothing of the untold millions of India and Russia in Asia, this virgin field should absorb in years to come all of the automobiles that America and other countries produce over and above their own actual needs, even when, as indicated in last week's THE AUTOMOBILE, the whole production amounts up to the astounding figure of several millions of cars.

In order of amount of duty collected from imports, cars, carriages and other vehicles and parts were number 28, with a total of \$1,547,123, upon which the average duty was 44.98 per cent. This amount is divided into automobiles and parts, \$1,518,340, and carriages but \$28,783. Over 1908 the former showed an increase of \$225,280 in duty, 17 per cent., and in value \$502,103, an increase of 17.5 per cent. The latter, on the other hand, increased the duty but \$4,022, amounting to 16.2 per cent., and in value \$10,823, equal to 19.5 per cent. From these figures it would seem as if the value of both automobiles and carriages is increasing faster than the amount of duty paid, this making it appear that cars of a much higher class are imported. If this be true, and there is no reason to doubt it, the case is just opposite to that of exported domestic makes, as the value of each machine exported is on the decrease.

Finally, balancing up the imports and exports for the fiscal year, the balance lies with the home manufacturers to a great extent. The exact figures are: Exports, \$5,387,021; imports, \$2,905,391, leaving the favorable balance of \$2,481,630. With the parts, however, the imports lead, the figures being: Imports, \$773,743; exports, \$605,179, an unfavorable balance of \$168,564. The whole gives a net favorable advantage for American makers of \$2,313,066.

Other countries imported and exported large numbers of machines of a high value, for it must not be considered that this country has any monopoly; in fact, just the reverse.

France's exportations of cars, valued at \$24,569,000 in 1908, were distributed as follows: United Kingdom, \$11,784,000; Belgium, \$2,229,000; United States, \$2,124,000; Germany, \$2,018,000; Argentina, \$837,000, while Algeria and other French colonies, India, Egypt and European countries received practically all of the remainder.

Italy exported most of her motor cars to European countries, \$1,297,000 worth going to the United Kingdom, \$985,000 to Switzerland, \$556,000 to Germany, while to the United States the exports were valued at \$664,000, and those to Argentina \$571,000, these five countries representing nearly four-fifths of the entire motor car exports of Italy during 1908, valued at \$5,533,000. From the United Kingdom the exports of cars and parts in 1908 were valued at \$6,124,000, of which \$592,000 worth went to British India, \$573,000 to New Zealand, \$176,000 to this country and \$123,000 to Canada.

The exports from Germany in 1908 were valued at \$2,936,000, together with parts valued at \$95,000. The greater part, valued at \$567,000, went to European Russia, while France took \$517,000 worth, Austria-Hungary \$474,000 and the United Kingdom \$448,000, while to Italy, Switzerland, Roumania, Argentina, Belgium and the United States, in the order named, were shipped the remainder of the export product.

MOTOR INDUSTRY IN ATLANTA

ATLANTA, GA., Apr. 25—There are over 1,500 automobiles in daily use upon the streets of Atlanta and 95 different makes of cars have agencies in the city, while the location of a big factory is being planned for the near future. The city has taken to the motor car with special avidity and has come to be known as the automobile center of the South. It is stated that the motor industry has done more for Atlanta's recent progress than any other single factor.

BEST PRACTICES LEAD TO SILENT ACTION

MAKERS of automobiles, understanding the situation perfectly, undertake to eliminate noise on the count that it stands for far more than the mere disagreeableness of the discords rendered up by ill shaped parts. To depend upon the ability of the workmen, no matter how skilled they may be, is to court disappointment; and even if the machine tools are the best that can be had, the situation is still confined to the realm of speculation, and in the long run it is necessary to provide instruments of precision in order that the workmen will be able to judge of the results they produce.

In the Rambler plant, as the illustrations here given will adequately portray, this matter is taken up on a basis which is intended to check with the design of the automobiles produced, taking into account the shapes of the parts, the materials of which they are made, and the relation they hold to the connecting members.

Limiting the discussion to the methods in vogue in the production of gears, Fig. 1 presents a quick and accurate method of measuring the diameters, in which A is a gear of the bevel type and B is an instrument which belongs to the extensometer group, and is capable of quickly locating an error of a small fraction of 0.001 inch even when the workman is more or less unskilled.

As a further indication of the extent to which this principle may be carried there is illustrated, in Fig. 2, an instrument which utilizes the principle of the micrometer and the extensometer. The gear G is having its pitch diameter determined; the yoke Y of the instrument holds the micrometer M at one terminal, and the extensometer E at the other. The instrument is so designed that the points jam on between the teeth of the gear just on the pitch line, and the pitch diameter may be determined within a small fraction of 0.001 inch.

Fig. 3 presents still another version of the methods of determining the dimensions of gears, and in this example it is the idea to illustrate the manner of noting how well a set of gears match up with each other. The gear G1 is centered on the plug P3, and the pinion G2 is centered on the plug P2. The distance between the plugs P2 and P3 is exactly right, considering the pitch and number of the teeth of the gear and pinion. The pointer P1 will take up a position of O on the scale S, if the work is so well done that the gear and pinion mesh properly on the pitch lines, but any departure from accuracy will show by the position of the pointer P1 on the scale. The plug P2 is attached to a moving part, so that it may be located with respect to the plug P3, but when the gear and pinion are properly made, the pointer should rest on 0 of the scale S.

As a further indication of the methods reference is had to Fig. 4 of an instrument which is employed to determine the accuracy of the bevel gear. It is just this class of gear that will

make noise, if it is not well made, and it is a problem to accurately finish a gear of this character. The gear G, rests on the base-plate B, through the supports S, which are so shaped that they engage the teeth of the gear at two points. If the gear is properly made the depth gauge will show a certain distance between its gauge point and the face of the base-plate. By rotating the gear 180 deg. and taking a second measurement, it is determined whether the gear is warped.

These methods tell of



Fig. 1—Extensometer used for determining outside diameter, working within a fraction of a thousandth of an inch of dead accuracy



Fig. 2—Combination extensometer and micrometer gauge designed to determine the exact pitch diameter of a gear

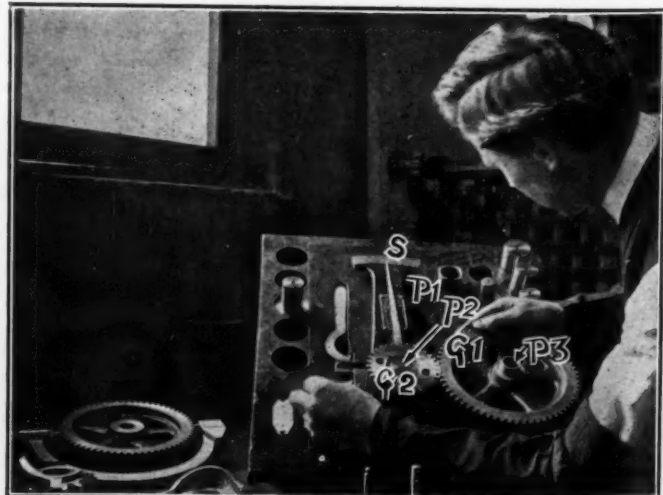


Fig. 3—Measuring instrument used to determine the relation of a pair of meshing gears, by means of which centers are determined

the character of workmanship which is done in a given plant, and unfortunately, in a sense, special instruments have to be devised for work of this character.



Fig. 4—Instrument employed in the inspection of bevel gears to ascertain if the pitch diameter is right



The Club House

NORRISTOWN AUTOMOBILE CLUB

John E. Rex
Pres.Earl C. Wenz
Treas.

ONE of the most useful automobile organizations in Pennsylvania, from the viewpoint of actual accomplishment, is the Norristown Automobile Club. It has only been in existence for about three years, but during that period it has done wonders and waxed strong and influential, not only in its own locality, but also throughout the State.

Like all organizations of its kind, it has some very wealthy men on its roll of membership, but, unlike most automobile clubs, the vast bulk of its members are simply active professional and business men whose wealth is still largely potential. As a result and without any slight upon men of money, the club fairly teems with vitality. It does things, and it does them with a snap and vigor that is refreshing.

There is not a speed trap nor horn trap in Montgomery County, despite the fact that there are three big automobile factories located in it or close to it. Such a thing as an arrest for careless driving or speeding is almost unknown, and, by the same token, accidents are exceedingly and gratifyingly rare.

The underlying reason for these conditions is the perfect understanding that has been worked out between the Norristown Automobile Club and the authorities. One might imagine that such a statement meant that the authorities overlooked violations of the law and were remiss in their duties, but as a matter of fact the secret of the situation is the terse principle upon which the club works. As stated by its President, John H. Rex, this is: "Always remember that the education of the public includes instruction of one's self."

The club has a fine home situated on the Ridge Turnpike Road, and equipped with everything adequate for comfort, enter-

tainment and recreation. It is presided over by Julius L. Ernotte, steward, the only paid employee or officer of the organization. There are 275 active members, and recently an arrangement has been entered into, between the club and the Century Motor Club of Philadelphia, by which the members of the Norristown organization have been taken into the Century as associate members, and those of the Century were made associates of the Norristown club. This arrangement is advantageous for both, as the Century has a magnificent clubhouse at Broad and Oxford streets, Philadelphia, while the Norristown Club will be an excellent country club for the city men.

In a sporting way the Norristown club occupies a prominent position. Its first road run was given in 1908 and occupied one day to Lancaster and return. This proved a success, and in the fall of that year a hill-climbing contest was given on Skipback Hill, one of the stiffest and most trying in the vicinity.

Last year the club gave a two-day run to Hagerstown and return, in which 52 automobiles participated. The route and conditions were particularly trying, and the inspection and checking systems put into effect by President Rex and Secretary William B. Hart were of such a nature as to add greatly to the honor of winning the race. These conditions were very strict and were enforced to the letter.

"We figured," said Mr. Rex, "that the value of endurance runs lay in exposing structural defects and mechanical errors in the cars themselves, as well as in demonstrating their good points. Our rules were framed along those lines, and as a result the winner must be a creditable machine."

On May 18 and 19 the club will put on its fourth event and its third road run. This will be 327 miles long and will cover every known variety of going. The out-trip starts from Hotel Montgomery, Norristown, and passes through Reading, Pottsville, Hazleton, Wilkesbarre to Scranton, at each of which places checking stations have been arranged. The return trip will be from Scranton to Stroudsburg, Easton, Allentown, Philadelphia, and back to Norristown.

The club looks for about 75 entries, which will be divided as follows, into two divisions and six classes. The first division is for manufacturers and sales agents. In Class A, cars carrying four or more passengers and valued at \$1,901 or over; Class B, four or more passengers, cars valued at \$1,900 or less; Class C, two or three passengers and cars listed at \$1,501 or more; and Class D, carrying two or three passengers and valued at \$1,500 or less. The second division is to be composed of members of the Norristown Automobile Club and other clubs affiliated with the A. A. A. and the non-contestant class under the new reliability rules.

The special regulations governing the run were something of an innovation and caused much comment at A. A. A. headquarters. This was particularly true of the following clauses:

"Between the checking stations each car may stop for a total elapsed time of ten minutes and no more without penalization, provided no repairs or adjustments of any kind whatsoever are made during the time elapsed, and provided that the motor is kept running. This does not apply to the clause covering tire trouble and adjusting non-skid devices, and is inserted in these rules to prevent excessive speed between checking stations. For example, if a car checks out at checking station "A" at 9 o'clock, and is due at checking station "B" at 10 o'clock, the wheels of that car must be in motion for fifty minutes of that hour, and the car cannot stop for a period of over ten minutes outside of the limits of "B" checking station, and cannot cross the line of "B" checking station before 10 o'clock sharp without penalization for overrunning time."

This rule prevents terrific speeding on good stretches of road for the purpose of advertising, and tends to equalize the chances of all contestants. Another thing required under the rules is a brake gear that will check a car moving backward down a 10 per cent. grade, in fifty feet.

Four fine pieces of plate are offered to winners. They are the McDonald and Campbell Trophy, the McCullough cup, Kelly-Springfield Tire Company's cup, and that of the Norristown Chamber of Commerce.

The club has also done good work in improving the roads. It has been stated that the highway extending from the clubhouse to Norristown was the worst bit of going in the State up to about a year ago. To-day that particular bit of road would take high rank with the best in the country. What has been done there has been done in varying degree throughout the county, and the farmers who have to drive to Philadelphia with produce enjoy the benefits quite as much as the members of the club.

It also acts as host to the poor children of the county when it conducts the annual Orphans' Day celebration at Willowgrove Park, and in a dozen different ways does its level best to popularize the motor car.

Its objects are the welfare of the automobile; education of its members to the rights of others, so that good legislation may be secured; co-operation with the local authorities to maintain the law and to promote sociability and good fellowship.

The club was formed in 1907 on a basis of nominal dues. It reached a membership of 100 and commenced its career of usefulness. In 1908 it was chartered under the laws of Pennsylvania, and July 9, 1909, it opened its clubhouse. It now has 275 members paying \$10 dues, and within a few months it is expected that some further changes will be instituted that will greatly add to the efficiency of the organization.

John H. Rex, a leading attorney of Norristown, is president and a moving spirit in club activities; Edward C. Meier, Phoenixville, is vice-president; Earl C. Wentz, banker, treasurer, and William B. Hart, secretary of a big woolen mill, is secretary. The prediction is made by the officers that the membership will soon be increased to over 500.

HOW SUNLIGHT DETERIORATES TIRES

ANYONE who has had experience knows that sunlight has a deteriorating effect upon tires. Obviously it is impossible to avoid exposing them to the light when running the machine, but when standing, it is the part of wisdom to favor them in any possible manner. To this end don't leave a car standing for hours where the hot sun will strike it—if you do you may find a flabby tire on your return, as an immediate result, with the ultimate ill effect not so readily overcome. It is far better to stop in the shade and walk a hundred feet to your destination.

And in the case of the car that is run mostly at night, it should be covered through the bright hours of the day when in

the garage. The man with his private garage can obtain this protection by providing heavy shades for the windows. Sections of old carpet or rugs are excellent for this purpose.

Some short circuits are exasperatingly hard to locate—so much so that many a car has been rewired because of inability to find one. As a last resort (and sometimes before), start up the engine in the dark and look for a spark that shouldn't be.

It is quite possible to show class in little things; a man who has regard for the niceties of the business does not put a rough forged or cast end of a jack against an axle without a doubled rag or piece of waste intervening.

HOW PRODUCTION PROBLEMS ARE SOLVED

(Continued from Page 791)

the manufacture of Brush Runabouts. It will be observed that the tools occupy relatively small space, and a single workman who may not be capable of doing anything else feeds the whole battery, which is devoted to the production of gears.

The tale of speed remains concealed thus far. Fig. 3 will help to illustrate the real story. In this figure the working part of one Fellow's shaper is brought clearly into view, in which it will be observed that the cutter is fashioning five gears at one time, they being G1, G2, G3, G4, and G5, which are fashioned by the multiple cutter tool T1, which is reciprocated in the axle plane of the gears, and given rotation concurrent with the rotation imparted to the blanks in the cutting process. The teeth are thus generated in conformity with the most approved practice, not by a unit method, with a fixed cutter which gashes for juxtaposition faces of two teeth, but by a series of strokes in progression until the whole number of teeth are generated to completion. The gears are clamped between spacers S1 and S2, on the mandrel M1, which in turn is held in rigid relation by the arm A1, which is adjustable in two planes, and is held in its socket S3, being clamped tight by the cap screw S4. When the blanks are clamped into place, the cutter is attached to the spindle and the machine is adjusted for running, all of which may be done within the briefest period of time, the shaper is started, and the gang of blanks have their teeth generated on without further attention of the operator. By having extra mandrels, the operator is enabled to mount blanks upon them while the machines are doing their work, and owing to this facility, a single operator is enabled to keep a gang of Fellow's shapers in substantially continuous performance, each one of which is doing five or more gears at one time, and in this way speed is accentuated to the maximum, whereas accuracy is absolutely independent of the man, and is the maximum attainable, due to the qualities of the tool employed.

There are many examples of gear shapers, planers, and cutters, each one of which has its special use, and Fig. 4 is offered as a further illustration of this phase of an important situation. In this a Schuchardt & Schutte type of Pfauter gear hobber is working on the balancing gear, which is used in the Brush Runabout motor to compensate for secondary moments, which are essentially produced in a crankshaft or a single cylinder motor when it is operating at high speed. The balancing gear G1 is mounted on a mandrel, which in turn is fastened to the platen by means of an extension E1, and the hob H1 is carried on its spindle in bearings B1, B2, and B3, taking power from a train of gears, the driven member of which is concealed by the housing H2. The hob rotates in its tangent relation to the gear to be cut, and is so adjusted that the teeth on the gear are fashioned in conformity with the demands, with the further advantage that the cutting is a continuous process, progressive in its character. In this type of tool, while it is true that but one gear can be cut at one time, it is worth noting that the speed of cutting is at a high rate, and a workman may feed a whole battery of these tools so that the labor item is reduced to a minimum basis.

In gashing beveled gears, the idea of ganging the work is a relatively new one, which was brought about on account of the desire of automobile makers to expedite the work, and at the same time add materially to the accuracy, which latter consideration was an absolute necessity in view of the modern idea *i. e.*, noiseless performance is the first requisite. Fig. 5 shows how this situation is satisfied in the production of Brush Runabouts, in which a Carter & Hakes Lincoln type miller operates upon three bevel pinions simultaneously with fixed gashing cutters C1, C2, and C3, in suitable relation with the pinions P1, P2, and P3, they in turn being on spindles S1, S2, and S3, which are rotated for the spacing of one tooth at a time by

means of a multiple dividing head, which is housed in the case C4. The gashing cutters are packed on a spindle S4, and are driven by a train of gears.

For the accurate generation of the teeth of beveled gears, which is the final process after gashing, Gleason, Bilgrim, or other suitable equipment is employed. With a view to a sufficient elucidation of the complete process, considering the gashing equipment as shown in Fig. 5, Fig. 6 is offered presenting a Gleason planer, which is shown in the process of generating the correct conformation of bevel gear teeth, and the gear G1 is shown in the chucking fixture C1, in its correct relation to the generating cutters of the tool proper, and the divers means by which the work is fed to the cutters for the purpose of generating theoretically correct teeth show in the illustration.

THE HEAVIER WORK REQUIRES DIFFERENT TREATMENT

Thus far, the principle of rapid production along accurate lines has been illustrated by means of automatic machine tools working on symmetrical and relatively light parts. That the idea is limited to work of this character, however, is not demonstrated by the facts, and Fig. 7, which was taken in the plant of the Regal Motor Car Company, is offered for the purpose of depicting a method of rapidly and accurately rough-boring cylinders. A twin cylinder C1 is mounted in a fixture F1 on the platen P1, of a double spindle vertical mill M1, and the spindles S1 and S2 are equipped with multiple cutters C2 and C3, which are guided into the cylinders by the bushed holes which register therewith. The whole process is rugged, accurate, and speedy. The fixture is quickly mounted into place, and finds its registering position in the absence of any great skill on the part of the operator who has merely to so place the fixture that the pins P2, of which there are two, may be inserted into place.

Fig. 8 is another Regal idea, in which a Wormer milling machine of substantial construction is fitted with multiple cutter straddle mills S1, S2, S3, S4, and S5, which are mounted on a mandrel M1 and so properly spaced that they face off the main bearings M1, M2, M3, and M4 of the crankcase C1, which is clamped to the platen P1, by means of C clamps C2, etc., of which there are four. The straddle mills rotate at the desired speed in the process of cutting, and the work which is clamped to the table, or platen, feeds across at the right speed for the purpose. This method has all the accuracy of the tool room, the speed which comes from the utilization of stout tools, and the main bearings are faced off at both ends simultaneously with the caps in place and bolted down, so that the speed which is obtained is not at the expense of accuracy in any way, nor is the workman personally relied upon for anything but his ability to feed the machine and watch it do the work.

The multiple spindle drill idea has been developed to a high state of perfection since the advent of the automobile, and Fig. 9, which was taken in the Regal plant, shows one of its possible applications; the upper half of the crankcase C1 rests on the platen P1, excepting for the intervening blocks B1 and B2. The multiple spindle drills are guided by the jig G1, and they feed downwards against the work by motion of the housing J1, and in the present case six of the drills are actually working, although any number up to as high as twenty-four are employed under varying conditions of automobile work.

Fig. 10 shows a vertical multiple spindle drill as used in the Regal plant, with one of the spindles S1, and a reamer R1, in its socket, guided by a jig G1, reaming the large end of a connecting rod C1. The jig is so contrived that the connecting rod may be put into place and locked speedily by the workman, and it may be freely moved around the platen P1 as the occasion requires. There are several of these spindles, and the work passes from one to the other in rapid succession so that the process is substantially continuous, and the accuracy of the work done is that which is fixed by the care with which the tools are sized in the tool room, quite independently of the skill of the workman in the finishing process.

Crankshaft finishing, in view of the high quality of the steel

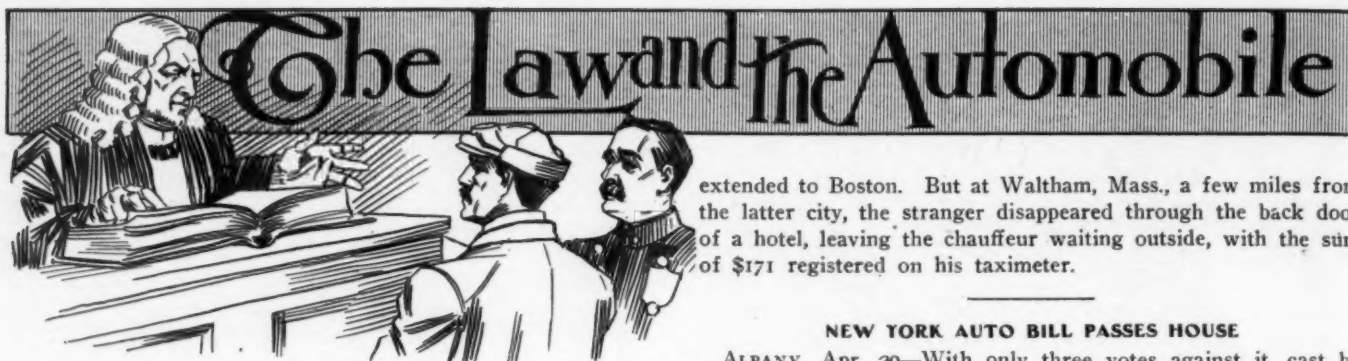
used in these members, and the accuracy demanded in practice, is something of a problem which only bows to intelligent treatment. The drop forgings are first rough-machined in a special crankshaft machine designed for the purpose, and they are thereafter set up in a suitable grinder, where the pins are brought down to the finished size. Fig. 11 presents a Landis grinder in the Regal plant, working on a Regal "30" crankshaft C1, and the big grinding disc G1, is reducing the middle main bearing of the crankshaft to a perfectly round and predetermined diameter. Water is fed to the grinding disk through the pipe P1, thus maintaining the temperature substantially constant, and it is a well appreciated fact in shop circles that grinding is not only rapid, but it has the special facility of finishing the pins to a round diameter. In turning work, as it obtains on a lathe, a perfect round is not obtained, and it is easy enough to see that a journal, if it is fitted to an elliptical pin cannot deliver satisfaction. Grinding, in view of this fact, is essential to success.

Conventional types of machine tools as they obtain for work in general are scarcely adequate from a specialist's point of view, as Fig. 12 very clearly indicates. This multiple spindle milling machine, which was designed for boring cylinders of the Everitt "30" made by the Metzger Motor Car Company, of Detroit, has four boring spindles, which are so centered with respect to each other that they register with and bore the four cylinders in the block casting C1, notwithstanding the fact that the top half of the motor case is integral with the block of cylinders. The casting is placed with the cylinder head down on the platen P1, and the spindles in their bearing housings H1, are rotated by means of a train of gears taking power from the cone pulley C2, and the belt which rolls over its periphery. The platen of the tool feeds the work up against the spindles, and this, it will be remembered, is the reverse to the customary method. By means of this special tool, this particular shape of motor casting, despite its tendency to complication, is finished expeditiously and accurately, so that in the long run, the motor becomes one of the most simple that it is possible to design.

Covers for cylinders and hand-holes in motor cases were considered very difficult of finishing up to the time when the flat grinder came into vogue. Fig. 13 presents the flat grinder idea, in which the covers C1, C2, etc., are placed on a magnetic chuck M1, and the grinding disc G1 is lowered down until the grinding face is in proper relation with the faces of the covers to be finished, when the platen of the grinder P1 feeds back and forth in the plane at right angles to the axis of grinding. The magnetic chuck holds the work, and the operator is enabled to change over after the grinding is completed in a few moments so that this character of machine tool has an enormous capacity, and the finished faces are to greater accuracy than is possible of attainment by a milling process, or if a planer or shaper is used for the purpose.

Grinding is one of the truly important processes in the modern shop, and Fig. 14 shows another meritorious application of the principle. In this case, piston rings P1 are first machined to near size, and then placed on the magnetic chuck C1, when the grinding disk D1 performs the finishing operation, first on one side of the rings, and then upon the other. The magnetic chuck enables the operator to lay the rings upon the face of the chuck and to immediately throw the traveler into gear, and by previously fixing the distance between the face of the magnetic chuck and the grinding disk, considering the design of the tool, the work proceeds substantially automatically, and the capacity of the two is very great. Accuracy is one of the assured conditions, and interchangeability follows, since the tool works within close limits day after day.

Vertical milling machines of a very massive type are coming into vogue for divers important operations, and Fig. 15 presents one version of this idea, in which the cylinder C1 is having its faces milled by the multiple cutter M1. The cylinder rests on the traveling platen T1, by means of which work the work feeds across in its correct relation to the multiple milling head and accuracy as well as speed is realized in practice.



REGISTRATION NOW PENDING IN KENTUCKY

Kentucky motorists are deeply interested in the automobile State registration bill, which is now pending before the Legislature, providing for the registration of automobiles with the Secretary of State. The bill is similar to that adopted by many other States throughout the country. The chief item of interest in the measure is that providing that a certificate of registration of any other State shall be considered a license for a car owned by motorists in another State to pass through Kentucky, provided a similar privilege is accorded Kentucky-owned and licensed vehicles in the States concerned.

Owing to the fact that a city license is not recognized in most other States, it is now necessary for automobilists whose cars are registered in any city in Kentucky to secure a permit from the Secretary of State or some other official after leaving the State. House bill 272 provides the registration with the Secretary of State and a fee of \$2 per car for such registration. Its speed regulations are ten miles per hour in the business districts, 15 miles in the residence portions of cities, and 20 miles per hour on the public highways. A fine of \$20 to \$50 is provided as a penalty for violation of the act. This act will repeal all laws and acts inconsistent with it.

FREE RIDE FROM NEW YORK TO BOSTON

BOSTON, Apr. 18—Anybody who wants a free automobile ride from New York to Boston can simply engage a taxicab—that is, if the taxicab driver will accept the engagement after he learns the destinations. The Supreme Court of Massachusetts recently decided that no law compelling patrons of taxicabs to pay for their rides exists on the statute books of the State.

However, the New England manager of an automobile concern is anxious to find the supposedly wealthy New Yorker who engaged a taxicab at Seventy-ninth street and First avenue, New York, for a ride to Bridgeport. The man spent money freely, and the chauffeur made no objection when the trip was

extended to Boston. But at Waltham, Mass., a few miles from the latter city, the stranger disappeared through the back door of a hotel, leaving the chauffeur waiting outside, with the sum of \$171 registered on his taximeter.

NEW YORK AUTO BILL PASSES HOUSE

ALBANY, Apr. 20—With only three votes against it, cast by Mr. Lansing (Rep., Rensselaer), Mr. Lee (Rep., Kings) and Mr. Gray (Rep., St. Lawrence), the Assembly passed the Automobile bill, handled in the lower house by Assemblyman Allan S. Callan (Rep., Columbia). This is the measure which makes a general speed limit through the country of thirty miles an hour; gives the three cities of the first class, New York, Rochester and Buffalo, the right to make their own traffic regulations; provides a speed limit of fifteen miles an hour in all second and third class cities and villages, and a registration fee to be paid to the Secretary of State at the rate of \$5 for cars of 25-horsepower or under; \$10 for cars between 25 and 35-horsepower; \$15 for cars between 35 and 45-horsepower, and \$25 for all machines above the 45-horsepower class.

"FARMER" DUNN GETS CAR AND COIN

Far-reaching in its purview is a decision rendered recently by the New Jersey Supreme Court in the case of Elias B. Dunn against the Greenhalgh Engine and Machine Works, of Newark. Mr. Dunn ordered some repair work upon his car and the parties agreed to a price for the work. After several tests, Mr. Dunn reported that the car did not work properly and the company declined to allow the machine to leave its possession until its bill, which exceeded the agreed price, was paid in full. The court decided that the company was in the wrong and the jury not only awarded the possession of the car to its owner, but also gave him a verdict of \$1,032 as damages for its unlawful detention.

NEW KENTUCKY LAW IS POPULAR

It is estimated that Kentucky will receive \$25,000 a year from the automobile tax which will become effective June 14. At present there are about 3,000 automobiles in the State and the number is increasing steadily. The majority of the motor cars are in Louisville. The tax is graded according to the horsepower of the cars and will range from \$5 to \$10 and \$15 a car. Automobile owners favored the law as it will give them a better standing and the protection of a State license. The speed laws were also changed to their liking.

MORE POLICE TO WATCH N. Y. SPEEDERS

To stop speeding by automobiles in the outskirts of New York City, sixteen bicycle policemen have been added to the force in the Bronx by Commissioner Baker. This is the result of several fatalities and serious accidents during the past few weeks. The six motorcycle men who formerly made up the whole speed squad of the Bronx will henceforth pursue speeders on upper Broadway, Pelham, and Riverdale avenues.

TESTERS MUST PAY LICENSE FEE

DETROIT, Apr. 18—According to an opinion rendered by Attorney-General John E. Bird, an automobile tester comes under the same ruling as a chauffeur in Michigan, with the result that he must pay a license fee of \$2, this being merely a nominal sum imposed for the purpose of giving the State control.

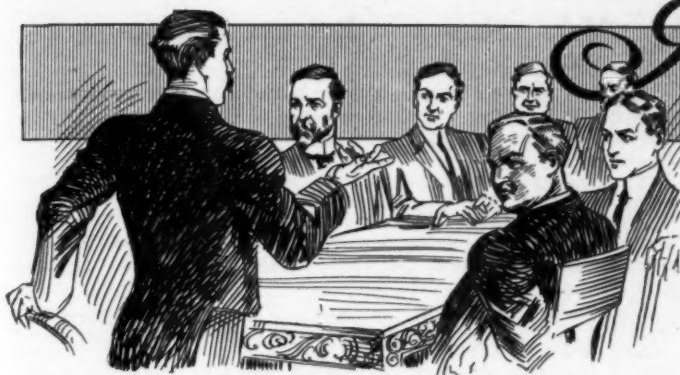
ROAD BUILDING NEWS

WILL ABANDON ROAD MAP WORK

Detroit Automobile Club will continue as a family country club, maintaining its present delightful quarters at Pine Lake. This action was decided upon at the annual meeting, sentiment being unanimous in favor of leaving touring and road map work and the maintenance of a city club to other organizations. This does not mean that the club will lessen its activities.

E. A. Skae, Frank H. Whelden and Sherman L. Depew have been elected to vacancies on the board of directors, to serve three years.

Commissioner H. L. Bowlby of the Washington State Highway department has authorized an expenditure of \$2,000 for the improvement of one mile of road between Asotin and Cloverland.



HARTFORD CLUB ELECTS OFFICERS

HARTFORD, Apr. 25—The annual meeting of the Automobile Club of Hartford was held at the club quarters in the Allyn House and the following officers elected: President, C. H. Gillette; vice-president, Arthur G. Hinkley; secretary, Phillip E. Curtiss; treasurer, C. De Lancey Alton, Jr. The chairman of the various committees were appointed as follows: House, Albert M. J. Kohn; Membership, Fred W. Dart; Contest, H. P. Maxim; Good Roads, Ralph D. Britton; Rights and Privileges, Colonel George Pope.

C. H. Gillette, the new president, was vice-president of the club two years ago and has always been an active worker in the organization, especially on the contest committee. Arthur G. Honkey was secretary during the past year. Phillip E. Curtiss is a newspaper man and was recently elected secretary of the Connecticut Automobile Association. The report of the secretary shows a membership of 337. The total receipts for the year were \$4,334.77, while disbursements were \$4,287.04.

CLUB WILL INSIST ON ROAD ETHICS

The Outagamie Automobile Club is a new county association of owners formed at Appleton, Wis., by thirty prominent citizens. Frank J. Harwood was elected president. The other officers are: Vice-president, Charles Hagen, of Black Creek; secretary and treasurer, P. M. Conkey, Appleton. Directors, Samuel J. Ryan, M. F. Barteu, Jacob Wolf, Dr. Laird and Sam Whedon, of Appleton; Dr. Charles Boyd, of Kaukauna; Arthur Miller, of Seymour; A. K. Dewick, of Shiocton, and A. Heller, of Hortonville.

The constitution and by-laws lay particular stress upon the object of imposing penalties upon members violating the rules of the road and conduct detrimental to the motor car's best interests. The club will affiliate with the Wisconsin State A. A. and thus with the A. A. A.

CLUB ACTIVITIES IN TWIN CITIES

MINNEAPOLIS, Apr. 25—The Minneapolis Automobile Club held its annual meeting recently and the following officers were elected: President, George M. Gillette; first vice-president, H. J. Clark; second vice-president, Charles D. Velie; secretary, G. A. Will; treasurer, Louis Koch.

The membership of the club has increased 55 since a year ago and the treasurer's report showed a surplus of \$6,389.51.

At a meeting of the board of directors of the Minnesota State Automobile Association in St. Paul, April 7, definite plans were made for the installation of sign posts along the main traveled thoroughfares throughout Minnesota. An Indian concern will furnish the posts and install them free of charge. The State association will pay for the standards.

BLUE GRASS AUTO CLUB IS ORGANIZED

Permanent organization was effected by the Bluegrass Motor Club at a meeting held recently at the Phoenix Hotel, Lexington, Ky. The following officers were elected: K. G. Pulliam,

president; E. H. Alexander, vice-president; James S. Helm, secretary; W. S. Viley, treasurer.

The following board of governors was also elected: K. G. Pulliam, James S. Helm, W. S. Viley, E. L. March, Alex Morgan, C. E. Lyons and Dr. H. H. Roberts. The club has a membership of 100, which is expected to double within a few months.

The club expects to have steel mile posts and guide signs placed on all automobile routes in the central part of the State.

LOUISVILLE CLUB WILL BUILD

The annual meeting, banquet and election of the Louisville Automobile Club was held at the Seelbach Hotel. The following officers were elected: President, Eugene Straus; first vice-president, L. H. Wymond; second vice-president, Hewitt Brown; secretary, Dr. R. Lindsey Ireland, and treasurer, Walter Kohn. Kohn and Straus were re-elected. In his annual report President Straus announced the preparation of plans for the construction of a clubhouse and garage in the central section of the city. The proposed building calls for an expenditure of \$25,000, which it is proposed to raise by the sale of stock.

PHILADELPHIA CLUBS PREPARE TO TOUR

PHILADELPHIA, Apr. 25—The Century Motor Club is planning a sociability run, which will be a leisurely affair based solely upon enjoyment. Two-hour dinner control and secret checkers will be two of the details of the arrangements. The exact date has not yet been selected.

Both of the ladies' automobile clubs are also planning annual outings. That of the Quaker City Ladies' Motor Club will probably come first, followed by that of "La Movigante Klaubo," which is quartered in Colonial Mansions in Fairmount Park.

CLUB PLEDGED TO IMPROVE ROADS

Owners at Manitowoc and Two Rivers, Wis., are organizing a club, one of the objects of which is to improve country roads and to raise funds for placing sign boards in Manitowoc county. Both cities are objective points of many parties during the touring season. J. E. Hamilton, millionaire manufacturer of Two Rivers, is slated for the presidency, and Edward J. Carroll, manager of a hotel at Manitowoc, will be secretary. About 100 members will sign the charter, it is expected.

SHOW BREVITIES

EASTERN MAINE AUTO SHOW

BANGOR, ME., Apr. 20—Under favorable auspices, the second annual automobile and motor show of Eastern Maine will open Saturday evening. Extensive preparations have been made, and the management is confident that the affair will be successful from every viewpoint. The show will be held in the Auditorium and will continue until April 29.

HARRISBURG SHOW A SUCCESS

HARRISBURG, PA., Apr. 18—The recent exhibition held under the auspices of the Harrisburg Dealers' Association proved to be a glittering success. One of the developments and results of the show is the emphasis laid upon the need of a large building in which to house the future events of this character.



Difficult Carbureter Adjustment

Editor THE AUTOMOBILE:

[2,240]—I have a light runabout, using a * * * carbureter. How would you adjust it to give the most power? It goes well at high speeds with the throttle open three or four notches, but seems to choke up if the throttle is opened over one-half. Your answers to inquiries about carbureters that have springs on the air valve do not apply in this case. Would it pay me to jacket the exhaust pipe and carry hot air to the inlet of the carbureter?

Moers, N. Y.

CARBURETER.

It is difficult to understand how a carbureter of to-day can be made and used without an air adjustment. If the carbureter in question has one, the adjustment of it goes as follows: Run the engine at its highest possible speed, and vary the air adjustment while so running to give all the speed possible. By varying the adjustment while the engine is running you will discover whether the result is favorable or otherwise. If favorable continue until the high point is found, while if unfavorable, turn in the opposite direction until the desired result is secured. Having adjusted this until the maximum possible speed is obtained, slow the engine down as slow as possible, then adjust the gas line feed so as to give the lowest possible number of turns per minute of the engine. This, too, will be found by experimentally turning in both directions. When the very slowest speed is found and fixed as to adjustment, and the same as to the high speed, the carbureter is said to be adjusted. Beyond this work, the only thing that can be done is in the nature of very slight additional changes which would be made on the road, to give slightly more or less speed, or more power at slower speed.

Now that warm weather is coming on, it would hardly seem advisable to go to the trouble and expense of supplying the carbureter with either hot air or hot water, which is essentially a cold weather provision, making vaporization more easy at that time.

There are, however, many makers who fit a source of heat to their carbureters even for summer use.

Cast Iron Welding

Editor THE AUTOMOBILE:

[2,241]—I have a Packard '06 car, but unfortunately have cracked the water jackets of both cylinder units. In one cylinder the crack goes through the cylinder wall proper. The break is very small and collects about half a cup full of water when the car is at rest. Could you recommend some firm which could weld the cylinders successfully? I should be much obliged if you would do this, as no one around here seems to know much about it.

Rhinebeck, N. Y.

H. M. SUCKLEY.

The success or failure of the welding process will depend somewhat upon the nature, size and condition of the break. If small, not opened up very wide, and with rough edges to help the welding material adhere, the job will doubtless be successful. This art of welding cast iron has advanced so much in the past few years that in your particular case it is well worth trying before purchasing new cylinders, which would be somewhat expensive. The best plan would be to bring the cylinders in to New York City, where there are many firms doing this kind of work. To mention a few of them: Davis-Bournonville Company, West Street Building; Industrial Oxygen Company, Hanover Bank Building; Schaap Flame Utilities Corporation, 344 Cumberland avenue, Brooklyn; National Electric Welding Company, 181 Christopher street.

Valve Sizes and Relative Importance

Editor THE AUTOMOBILE:

[2,242]—I should like to ask your opinion about the valve sizes and lift in modern automobiles. Are not the size and lift of valves an important function of gas engine efficiency; almost as important as cylinder bore and stroke because of what use are large cylinders if they cannot be completely filled and emptied with each explosion? The effective power of various cars will vary widely with the same cylinder displacement, and while there are many elements contributing to the efficiency of gas engine power, it seems logical to believe the valve details are a most important item.

All details of engine construction are widely advertised as an essential in rating the car except the valve construction, and these records are very rare. In fact, it seems to be a carefully guarded detail with many makers. At both the New York Automobile Shows every maker would tell you all about the cylinder bore and stroke, about the crank, pistons and engine with perfect freedom of knowledge, but when you come to valves they simply are ignorant or cautious. Some would guess at it, others did not know. Foreign makers were frank enough to say it was none of your business, you could buy a car and measure it. Why is this such a mysterious secret?

The quick rejection of hot gases through ample exhaust valves is a most direct means of reducing heat in cylinders, and the cooling system would be designed in proportion and yet they consider this unimportant. It is generally understood that engines for high speed work must have extra large valves, and if so, why would the same valves be undesirable for ordinary work. Manufacturers may feel a hesitation in letting competitors have the information and think the ordinary layman has no business with it. This is a great period of mechanical study, it is universal, and the layman is really the buyer. The purchase of a new car is a very important expenditure for many and it is natural that he should want to feel that his new car is reasonably proportioned for his use.

Many manufacturers will say that their engineers know their business and that their cars are always satisfactory, but satisfaction in a car is more or less a matter of degree based upon previous experience in a comparative sense. A person could easily buy a 50 horsepower car with too small valves and express general satisfaction, in perfect ignorance of what the same car would do if properly proportioned throughout. It may compare favorably with the old car he has just gotten rid of, and yet he will calmly explain that he does not care for speed when he swallows dust from many 20 and 30 horsepower cars, and he will continue to maintain his position that he has not been "stung."

This is a matter that should be scientifically proportioned from practice, and it seems to me an evidence of lack of confidence when a maker will dodge giving this detail about his own product. I would like to hear your opinion and I would like to hear manufacturers explain their ideas of valve importance, just for general information.

D. C. N. C.

New York City.

In the beginning and even right down to this day valves were proportioned to the speed of gas flow allowable and the quantity of gas to be passed through the valve. Thus, a lineal dimension as speed in feet per minute times a fixed area results in a volume that is, the volume of the gases. In the case of the inflowing gases this volume is fixed by the cylindrical capacity of the cylinder to be fed, but in the matter of the heated and expanded exhaust gases the volume cannot be determined so accurately.

So it is that the latter has always been a guessing point. When a manufacturer has guessed right, and proved it by actual results, he is not usually willing to give this advantage away to his competitors. More than this, the starting point, the allowable speed of the gases is a sort of guessed-at point, which is being constantly revised, so that the whole design of valve ports and valves is somewhat shrouded in mystery.

Later engines have shown that for any given figured area of port, taken in conjunction with the speed and valve lift to give a predetermined volume, there were two matters which could be varied with varying success. Thus, the older engines had high lifts with small valve ports. Lately, it has been found that superior results could be obtained with larger valve openings and lower lifts, the net area or volume being the same. The extreme speeds now obtained in racing cars is in part due to this fact, and the universal recognition of it, but the makers who found it out by costly experimentation were not the first ones to publish that fact.

Unequal Wear of Two-Cylinder Engines

Editor THE AUTOMOBILE:

[2,243]—Will you please answer the following question: Will the front cylinder of a two-cylinder gasoline engine wear out of round owing to the different angles of the connecting rod and crankshaft on the firing stroke?
HAVENS BROTHERS.

Ladoga, Ind.

If the above question is understood correctly, reference is had to a nearly obsolete form of engine, in which the crankshaft was set across the axis of the car, so as to have a straight line chain drive from the transmission located on the crankshaft to the rear axle. In this form, the load on the springs, when fully applied, lowered the rear end of the engine so that it set at a slight angle to the horizontal. This condition is only possible with this location of the engine, since with the engine placed across the frame, that is, with the crankshaft axis parallel to the axis of the car, as is the usual case now, this could not happen. Both cylinders would then be depressed equally.

In the case under consideration it is believed that the cylinders would wear slightly out of round in any case, purely from the nature of the situation, that is, the natural tendency to wear would be augmented by the force of gravity. This, however, would be effective in the case of both front and rear cylinders, and that any additional action would take place in the front cylinder is to be doubted, in fact, it would seem as if the rear cylinder would depart more from a horizontal line than would the front one. This is because the rear end of the chassis would come down under the load more than the front. The whole action is nearly negligible.

Age No Bar to Chauffeurs

Editor THE AUTOMOBILE:

[2,244]—Will you kindly consider the following and give me your opinion in "Letters Interesting, Answered and Discussed?" I am a boy 16 years old, of medium height and weight. I have had experience driving automobiles for the past five years, during which time I have driven them for thousands of miles. I have also taken care of them and done repairing. Would you think a person as young as I am could obtain a position as a chauffeur in the summer months on extended tours?
S. M. J.

Middlefield, O.

Age should be no bar to employment as a chauffeur, either on extended tours or otherwise. If a man can prove his worth as a driver there should be no question as to his age. If your mechanical ability is such that you can handle cars, repair them, and generally take care of them, age, height, weight, color, nor previous condition of servitude would be no bar to your obtaining and holding a good position as a driver. Several of the prominent racing drivers now before the public are but 18 years old; surely if these boys can manage a racing car, a chap but two years younger can handle a car under less strenuous conditions.

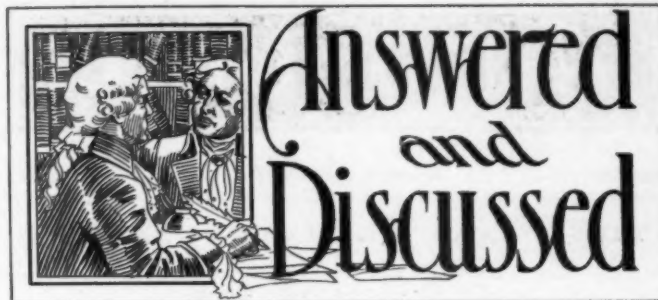
Cannot See Very Well

Editor THE AUTOMOBILE:

[2,245]—I wish to call your attention to letter number 2,169, February 17, 1910, issue of "The Automobile," in which you state that a full description of the Keystone car is given in the issue of July 15, 1909, page 109. I cannot find the Keystone car mentioned on that page or in that issue. Please let me know through the columns of "The Automobile" where I can find a description of that car.
A SUBSCRIBER.

Zanesville, O.

On page 109 of the July 15 issue of THE AUTOMOBILE for 1909, Volume 21, the entire page is devoted to the Keystone car. This page shows a special head of the car in question, marked "Keystone Six-Sixty," following which are some 1,000 words descriptive of the car, ending with a picture of the engine, labeled "Keystone Six Engine Has Two Separate Exhaust Pipes." The writer above could never have looked at the right page, or he would have the story in question, as it occupies the whole page to the exclusion of everything else.



Danger of Breaking Crankshafts

Editor THE AUTOMOBILE:

[2,246]—Will you please answer the following questions through the columns of "The Automobile," of which I am a subscriber and interested reader: Is there any danger of breaking or injuring the crankshaft of a four-cylinder engine having only two or three plain bearings by starting it on the battery without cranking it over? It seems to me that this puts a great pressure on the crankshaft while it is not in motion. Can you tell me of any cement or anything of that kind to stop small cracks in the cylinder walls? It is a very small crack, just enough to allow the water to seep through to the inside after it has stood for a long time.
F. L. S.

Del Rio, Tex.

While the starting strains on a crankshaft are severe they are no more severe than the strains set up in pulling through deep sand, in climbing a steep hill with a retarded throttle and in many similar circumstances. Even if these strains were more severe it would be a poor make of crankshaft which did not have incorporated in its design a sufficiently large enough factor of safety to take care of these strains and still leave the shaft safe.

Elsewhere in this issue, you will find a car description, in which is given a reproduction of the working drawing of a crankshaft, with dimensions, finish marks, and everything necessary. A study of this, in comparison with the size and rated power of the engine, will soon convince you that the makers know what they are about in the matter of crankshaft sizes and proportions.

Very small cracks in the waterjacket, such as you describe may be fixed by putting into the water circulating system a small quantity of Sementol, a preparation made by the Northwestern Chemical Company, Marietta, Ohio. There are probably other similar preparations made.

Gear-Grinding Noise and a Remedy

Editor THE AUTOMOBILE:

[2,247]—Will you kindly explain through "Letters Interesting, Answered and Discussed" in your very good paper, what is the matter with the transmission gears in my model E Jackson car? The same has been noisy ever since I received the car, and after driving it about 800 miles developed a knock which was very noticeable on first and second speed, and even when not in either, but upon third could not be detected. I thought the jackshafts were loose and returned the same to the factory as per their request, but they inform me that such is not the case, but want to replace the gears because the same are slightly battered and chipped. Now, they are so very slightly battered and chipped that I don't see how they could have caused the continuous noise and the knock which developed, but has not grown worse. Kindly let me know your ideas in this puzzling case in regard to the trouble, as I cannot agree to their proposition.
C. B. ISLEY.

Attica, Ind.

In a case similar to this, but which concerned another car, the transmission being located on the rear end of the unit power plant, the factory engineers stated that the principal trouble lay in the slight lack of adjustment of the bevel gears, which were nearly 30 inches away from the transmission suspected of making the noise. Gear noises have often been cured for good by a change of lubricant, such as the substitution of a heavy grease for a light one, or grease with graphite for grease without, or even in one case, of sawdust with graphite for all other lubricants. You might try one of these changes and see if it does not bring about a happy result.

THE AUTOMOBILE

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No. 17

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H. M. SWETLAND, President

A. B. SWETLAND, General Manager

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Grinding methods obtain in the plants devoted to the manufacture of automobiles as they never did before, and to an extent so great, considering complex operations, that it is almost a wonder. In these days, camshafts are invariably ground; even the contour of cams are so shaped by grinding methods that they assume great accuracy. This is a matter of more than a little moment; cams, unless they are precisely shaped, are scarcely likely to do good work, and, since they are rendered glass-hard before they go into place, it is obvious that no other method can be used to render them fit on a basis of grinding accuracy.

Crankshafts are difficult to make, unless they are rough machined, and then ground, and it is the common practice of the makers of automobile crankshafts to grind them. Pistons, rings, cylinders, and, in fine, all the parts of importance are ground, but the end is not yet. Gears may now be ground after they have their teeth fashioned and are rendered glass-hard by suitable heat treatment. It is this particular practice, which is the latest addition to grinding methods, that is attracting the notice of automobile engineers. The new grinder, despite the enormity of the undertaking, is proving to be of the greatest possible service; it is so made that after the teeth are approximated in the regular way, using gear cutters at high speed, the gears are hardened and they are then set up in the grinder to be finished.

The new type of grinder is so made that a nest of gears to be finished are pressed on to a mandrel and set

up under the control of a dividing head. The dividing head rests on a table which is provided with a feed, and the teeth of the gears are passed along so that the grinding disk of the required shape takes off the requisite amount of metal from the teeth to bring them down to a true shape and to the right size. That the grinding disc would soon wear out of shape is well appreciated, and in order to avoid this, it passes up against a diamond cutter each time a cut is made over the teeth of the gears so that the shape of the grinding disc is corrected as rapidly as wear tends to reduce it from the standard set. The tool is automatic within limits, has a large capacity for work, and the gears finished by this process are so precise that they mesh perfectly on the pitch line and run without any noise at all. That this is the greatest advance in automobile construction, for at least a year, is quite plain, and it represents one of the grounds for assuming that the automobile of the future will be a most perfect device.

Predictions are frequently made that the automobile is now up to its limit of development; these prognostications come from users of some judgment; they are based upon experience, but they are not necessarily true. In order to be able to judge of the future, it is necessary to visit the makers of automobiles and see what they are doing. Men who devote their lives to the perfection of automobiles are too much in earnest to stand still; advances are bound to be made; if a convict can break out of a stout jail, despite the fact that he is being watched day and night, it is not too much to expect of men of great intelligence, that they will break out of trouble when it confronts them. Scarcely a month goes by without recording some noteworthy advance in the process of manufacturing automobiles, and the troubles of yesterday give way to the victories of to-day.

Testing automobiles as they are manufactured in a large plant devoted to the purpose is a problem which has to be coped with, and that it taxes the ingenuity of makers, is admitted. When an experimenter builds one equipment, be it an automobile or any other generic type of machine, his first concern is to test it and ascertain what it is good for. If one machine must be tested after it is made to determine its competence, remembering that it is made under the eye of the designer, how can it be that 20,000 machines can be built and placed at the disposal of ultimate users with assurance that each one of them will be all right, if they are not tested. It might be the claim that after the first machine is made and found to be in good working order, all the remaining machines may then be taken on trust despite the fact that the designer cannot spread himself out so thin that he will be able to give each one of them the benefit of his skill and judgment.

Experience has never shown that machines can be so well made that they may be turned out in vast quantities, even allowing that all the parts be carefully inspected, and never have occasion to make further adjustment after the machines are completed and started. The amount of attention that each completed article must receive may be but slight, but it is ruinous to a reputation to disregard this difference. The amount of expert attention required will decrease in proportion as process testing is resorted to.

First Annual Up-State Relay Club Run

MAY 28, the first annual Central New York Relay Club Run will leave Syracuse, New York, carrying messages from prominent men and officials of the National and State automobile associations, which will be relayed from club to club by the participants in the run. The messages will be relayed through Auburn, Cortland, Ithaca, Watkins, Elmira, Owego, Binghamton, Oneonta, Cooperstown, Richfield Springs, Utica, Rome, Oneida, and back again to Syracuse.

The arrival of the tourists in each place will be made the occasion of an informal entertainment, with the local club as host, at which the messages will be read, an interchange of

views had on important subjects, and a good time enjoyed.

In order to add zest to the event, a secret time within the speed limits for each lap of the run will be set, and the car making this distance nearest the secret time will be given a prize donated by promoters of the run. An E-M-F "30" touring car was selected to lay out the route. The official pathfinder left Syracuse Saturday morning, and is expected to occupy a week.

The run will require four or five days, and the dates have been arranged so that they come not only at the season of the year when the country is in its prettiest garb, but also to include three holidays—Saturday, Sunday and Memorial Day.

NEW CLUBHOUSE FOR BUFFALO CLUB

With a burst of enthusiasm, the Buffalo Automobile Club raised \$11,020 in less than an hour as the nucleus of a fund to be used to build a clubhouse at Clarence Hollow, seventeen and a half miles from Buffalo on the Main road. This action was taken at a smoker which was held in the temporary club-rooms in the Teck Theater.

The club has acquired a tract of seventy acres of land and the structure will be in colonial style of rough base-boards and stucco decorations. Plans and drawings were exhibited by Lawrence Enos, president and Robert Cartere, architect.

The whole expense of the project will be in the neighborhood of \$75,000 and a bond issue has been authorized to raise the money. It is expected that the clubhouse will be ready for occupancy by July 1.

The bonds will be issued in two denominations, \$10 and \$100, and the whole amount of the fund, it is expected, will be raised within a few weeks among the club members.

WILL BUILD BIG BATTERY PANT

Storage batteries and other electrical appliances will be made on a larger scale at Niagara Falls when the new plant of the United States Light and Heating Company, ground for which was broken recently, is in operation.

The company already has three large factories and is incorporated in the new works. The initial outlay for building will be \$300,000 and the plans, as far as they have been completed, include thirteen buildings, covering ten acres.

JOB FOR "GOOD ROADS" MAXWELL

Following the resignation of Charles J. Forbes, Jr., former secretary of the Cleveland Automobile Club, M. M. Maxwell, known as "Good Roads Maxwell," has been appointed to fill the office. He was formerly secretary of the Ohio Good Roads Federation. He was also for several years a writer on Cleveland newspapers.

Coming Events in the Automobiling World

- Apr. 23-29.....Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.
- June 20-July 6....Detroit, Mich., Industrial Exposition. Detroit Board of Commerce.
- Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
- Jan. 17-24, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
- Feb. 13-25, 1911...Chicago, Coliseum, Tenth Annual National Automobile Show. N. A. A. M.

Races, Hill-Climbs, Etc.

- Apr. 30-May 2....Philadelphia Roadability Run to Atlantic City, Quaker City Motor Club.
- May 5-7.....Atlanta, Ga., Track Races. Atlanta Automobile Association.
- May 9-11.....Harrisburg, Pa., Fourth Annual Reliability Contest to Atlantic City and Return.
- May 18-19.....Norristown, Pa., Third Annual Endurance Run, Norristown to Scranton and Return.
- May 19-21.....Hartford, Conn., All-Connecticut Reliability Contest.
- May 21-22.....Bay Ridge, L. I., Club's Endurance Contest Around Long Island, Crescent Athletic Club and Long Island Automobile Club.
- May 21-22.....Track race meet, Memphis, Tenn. Homer C. George, Manager.
- May 27, 28-30....Indianapolis, Ind., Automobile races including championship events on motor speedway.
- May 30.....Bridgeport, Conn., Hill-Climb up Sport Hill; Automobile Club of Bridgeport.
- June 4.....Worcester, Mass., Fourth Annual Hill Climb, Dead Horse Hill.
- June 11.....Wilkesbarre, Pa., Annual Hill-Climb up Giants' Despair, Wilkesbarre Automobile Club.
- June 12.....New York City, N. Y., Trade Association, Orphans' Day Excursion to Coney Island and Return.

- June 15.....Cincinnati, Seventh Annual National Reliability Run for Glidden Trophy, through the Southwest.
- July 4.....Wildwood, Pa., North Wildwood Automobile Club, Race Meet and Club Run to Track.
- July 30.....Wildwood, Pa., North Wildwood Automobile Club, Race Meet and Club Run to Track.
- Sept. 5.....Wildwood, Pa., Speedway, Labor Day Race Meet of N. Wildwood A. C.
- Sept.....Chicago Commercial Car Reliability Contest of Chicago Automobile Club.
- Oct. 1.....Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
- Oct. 8.....Philadelphia, Fairmount Park race. Quaker City Motor Club.
- Oct. 15.....Long Island Motor Parkway, Grand Prize, Automobile Club of America.

Foreign Shows and Races.

- Apr. 27-28.....Brooklands, England, Two-Day Meeting.
- May 1-Oct. 1....Vienna, Austria-Hungary, Automobile and Aviation Exposition.
- May 25....."The American Cup," Argentina, Sociedad Sportiva Argentina, near Buenos Ayres.
- May 28-June 9....St. Petersburg, Russia, Automobile Exhibition.
- May 29.....Copa Catalunya, Voiturette Race of the Royal Automobile Club of Spain, near Barcelona.
- June 2-8.....Prince Henry (German) Touring Competition.
- June 13-18.....Scotland, Scottish Reliability Trials.
- June 20.....French Voiturette Race.
- June 21.....French Stock-Car Race.
- June 22-July 5....Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.
- June 27.....Speed Trials at Kiev, Russia.
- July 12-18.....Ostend, Belgium, Automobile Week.
- July 20-25.....Boulogne, France, Automobile Week.
- Aug. 1-15.....Ardennes, France, Meeting.
- Aug. 15-Sept. 15..French Industrial Vehicle Trials.
- Aug. 21.....Salon, France, One and Five Kilometer Trials.
- Aug. 23.....Mont Ventoux, France, Hill-Climb.

MANY ENTRIES FOR QUAKER CITY CLUB RUN

ULTRA-modern—up-to-the-minute in every respect, will be the Third Annual Roadability Run of the Quaker City Motor Club, which starts Saturday morning, April 30, from the rooms of the club at the Hotel Walton, Philadelphia, and traverses the State of New Jersey to Atlantic City.

Indications point to many more than 100 entries and club officers believe that at least 150 cars will make the run. The entry box remains open until Wednesday midnight.

The course is about 68.2 miles long and the finishing line is opposite the Hotel Strand at Atlantic City.

Special arrangements have been made at Philadelphia and Atlantic City and at various intermediate points to police the

route of the cars, and elaborate plans have been laid to welcome and speed the contestants at a number of places en route.

The trophies consist of five magnificent pieces of plate and five series of approximation prizes, all of which are well worth the effort of winning.

The unique feature of the run is the "secret time" arrangement by which the prize awards will be made. A plan has been followed in this particular, that is different from any of the usual ideas of a secret time and all that has been announced is that Mayors Reyburn and Stoy have agreed on a time within the New Jersey speed laws and the cars that most closely approximate their figure, will win.

BRIDGEPORT MAY HAVE AUTO TRACK

Plans for an automobile race track at Bridgeport, Conn., have been brewing for some time, and the idea has met with much encouragement in that vicinity. The plan, as most definitely outlined, contemplates the construction of a course back of Lordship Park, where conditions are said to be particularly favorable for such an undertaking.

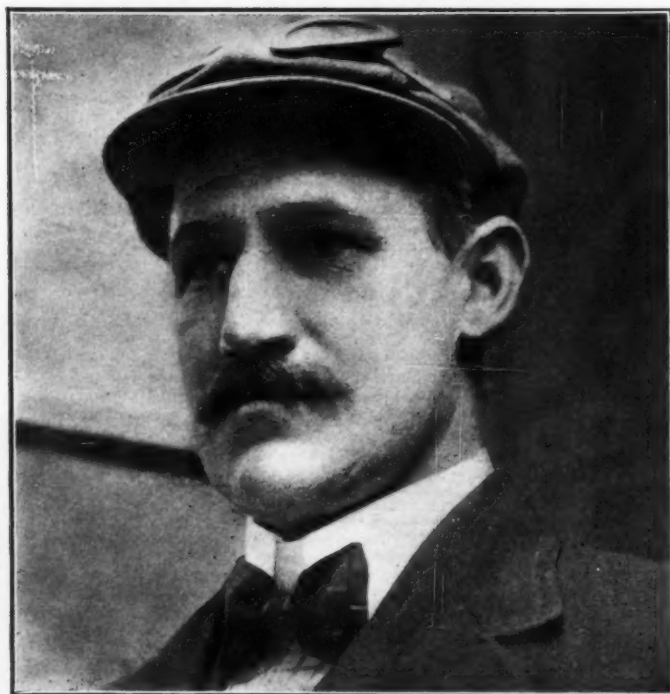
The Bridgeport Automobile Dealers' Association is behind the tentative plans that have been put forward at this stage.

PREPARING TO TIME ROAD RUN

Details and plans of service for the newly organized Timers and Scorers Club of Philadelphia were discussed at a meeting of that body at the Quaker City Motor Club last Friday evening. The chief matter under discussion was the Third Roadability Tour of the latter club which commences April 30.

Work upon the revision of the system to be used in the coming Fairmount Park race has commenced. The club is seeking some means of improving the score-sheet and blackboard system in use last year and has under consideration two mechanical timers. The club is being drilled with particular care for the big event.

Paul B. Huyette, president of the new club, is a wealthy and enthusiastic automobilist. I. C. Minford, secretary, is the automobile editor of the *Evening Times* of Quakertown.



I. C. Minford, Secretary of the Scorers' and Timers' Club of Phila.

HARTFORD CLUB TO ENTERTAIN

At a recent meeting of the Board of Governors of the Automobile Club of Hartford the following committees were named: House and Entertainment—Albert M. Kohn, Wallace T. Fenn, Frank J. Knox, J. G. Hawley, Louis P. Strong. Contest—Hiram Maxim, Arthur G. Hinkley, Henry W. Nuckols, Albert M. Kohn, William T. Plimpton, Samuel A. Miner, William C. Russell. Rights and Privileges—George Pope, Dr. Harmon G. Howe, Edwin Y. Judd, Walter C. Faxon, Frank J. Knox. Good Roads and Signboards—R. D. Britton, C. D. Alton, Jr., F. A. Morley, John E. Bruce, Samuel C. Doty.

Plans were made for entertaining the selectmen of all the towns in Hartford County as well as the heads of all the granges at a near future date. The club has a number of important suggestions to make to the officers concerning the application of automobile legislation and regulation.

READVILLE TRACK FOR AUTOS

Earnest efforts are being expended to secure the racing plant of the historic Readville race track for a permanent motordrome and aerodrome. The track upon which so many gallant thoroughbreds and harness champions have appeared has seen its last Grand Circuit meeting, and as it has been proven that the track is admirably suited to some forms of motor racing, even in its present shape, the chances appear rosy that it will be taken over, possibly by the Bay State Automobile Association, and used for automobile racing.

STATE AUTO CLUB IN NORTH CAROLINA

With the object in view of forming a State automobile association, a general meeting of North Carolina motorists has been called to assemble at Greensboro, May 9 and 10. The objects to be attained by tentative organization are the furtherance of the interests of the automobile; the upbuilding and maintenance of the roads of the State; the formulation of adequate legislation for the benefit of all users of the highways; the enforcement of the rules of the road and the banding together of automobile owners for mutual protection and advantage.

TEXANS FORM AUTOMOBILE CLUB

With a charter membership of 90, the Beaumont Automobile Club of Beaumont, Texas, was formed recently at an enthusiastic meeting of motor owners of that city. Edward Stedman was chosen president; W. C. Gray, vice-president; S. S. Solinsky, secretary, and E. A. Blanchette, treasurer.

COMMERCIAL CAR CONTEST PLANNED

CHICAGO, April 25—The Chicago Automobile Club's contest board has decided to schedule for early September a commercial car contest in which it will be the aim to demonstrate to the business world the feasibility of motor transportation.

Atlanta - New York Tour Announced

PRACTICALLY identical with the rules for last year's run will be the regulations for the New York Herald-Atlanta Journal Good Roads tour, which will start on June 6 in Atlanta and finish June 14 in New York. Application for dates and sanction was formally granted and the entry lists will soon be submitted to the automobiling public.

The roads along the national highway, which were dedicated to the Good Roads tour last year, are reported in excellent shape, despite heavy rains. This proves the value of such preparation as was given prior to the run last Fall. It is planned during the next six weeks to put the whole route in the best of condition.

Interest in the tour is widespread in the South, and as soon as the preliminary arrangements have been completed, it is expected that the entry list will swell to large proportions.

A number of runs, all centering at Atlanta and tapping half a dozen Southern States, are being arranged as feeders for the trunk tour from Atlanta northward.

Officially the *Herald-Atlanta Journal* Tour of 1910 will be known as a contest of the "Fourth Grade," under classification A. This is the price class used in the 1909 tour, but for 1910 it

includes seven divisions instead of six. The grades are as follows: \$800 and under; \$801 to \$1,200; \$1,201 to \$1,600; \$1,601 to \$2,000; \$2,001 to \$3,000; \$3,001 to \$4,000, and \$4,001 and upward.

This method of classifying cars serves to separate the lower priced machines, of which there are a very large number, making four divisions up to \$2,000, as compared with \$3,000 last year. It makes two divisions of cars between \$1,201 and \$2,000, instead of one division from \$1,250 to \$2,000, as required by the rules of 1909, thus equalizing the prize winning chances of many cars that heretofore were unduly handicapped. It will require a tour of the Good Roads type to fully demonstrate the value of the new classification, but the manufacturers are convinced that they have worked a big improvement.

Another change, and one that will be appreciated by the entrant who encounters trouble on the road or who lags behind through overconfidence, is that the rules this year allow three minutes before penalties begin at controls. Heretofore only two minutes have been allowed, and, while the added time is not great ordinarily, circumstances will undoubtedly make that extra minute look like a life saver in many towns this season.

POINTER FOR NOVICE DRIVERS

In a recent issue of *Harpers Weekly*, H. W. Perry writes some valuable pointers to the novice on the art of driving. Mr. Perry says that the beginner would do well if he took this advice: "Focus your gaze as far as you can see the road distinctly. The proficient driver learns early to watch the road far in advance of his car. On a straight, level road this may be several miles; on a winding road, only as far as the next turn; on a hilly road, the crest of the next hill; on a city street, as far as the condition of traffic permits the way to be seen clearly.

"By following this practice, small obstacles on the surface of the road may be seen long before they are reached, and, almost unconsciously, the machine is steered to avoid them.

"On the other hand, the novice or indifferent driver who concentrates much of his attention upon the road directly in front of his wheels does not see impediments far enough in advance to begin a gradual movement in avoidance of them, and is constantly in tight places on account of his lack of foresight. The difference in comfort to the passengers riding with a good driver and one who is not proficient is enough to prove of itself the soundness of this reasoning.

EMPLOYERS WANT TO BE SHOWN

Reliable chauffeurs are in sharp demand by private owners and taxicab companies, according to Charles A. Sibley, who conducts the Y. M. C. A. employment bureau for automobile drivers at 318 West Fifty-seventh street. Mr. Sibley says, however, that the employers are much stricter than they used to be with regard to qualifications.

Careful men who understand how to drive automobiles are at a big premium, but it is "bad going" for those who have blotched records, according to Mr. Sibley's observations.

LICENSED DEALERS ORGANIZE

Following the cue of other cities, Baltimore dealers who handle cars manufactured under the Selden patent formed an association known as the Licensed Automobile Dealers' Association, along similar lines to those laid down in New York, Philadelphia, Los Angeles, and other cities. There was a full attendance of the dealers at the Hotel Belvidere, April 20. Plans have been made whereby the members of the association intend to conduct their own show.

STATE TO INSTALL STONE CRUSHERS

MINNEAPOLIS, Apr. 25—Minnesota motorists, and especially those who use the country highways extensively for touring, found much comfort in the action taken by delegates to the State Roadmakers' convention. Much enthusiasm over the prospects for road betterment prevailed. Members pledged themselves to urge the State to install crushing plants in various parts of Minnesota for use in the work. A campaign was also inaugurated to urge a larger State appropriation for good roads, while plans for the expenditure of all State funds under supervision of the Highway Commission were mapped.

WILL MAKE AUTOMOBILE TRUCKS

ATLANTA, Apr. 25—Trucks capable of hauling from one-half to three tons will be built in this city in the near future, according to plans that have just been announced. The new vehicles will be called the McNeil truck and delivery wagons and they will be made by a company consisting of W. S. McNeil, W. S. McNeil, Jr., and J. McNeil.

It is planned to turn out the first of the trucks in two months. The weekly output will be not over five cars.

HILL CLIMB PROFITS FOR CHARITY

At a meeting of the South Bend Automobile Club, held in the Oliver Hotel last week, it was unanimously agreed that the club should co-operate with the city officials in the enforcement of traffic regulations.

It was agreed that the hill climb suggested by M. L. Williams of the 20th Century garage should be made a club event, and that all fees, entries and receipts be turned over to the Children's Aid Society.

AUTO PAYS FOR JERSEY'S HIGHWAYS

Figures compiled by J. B. R. Smith, State Motor Vehicle Inspector for New Jersey, show that during March the license fees paid into the treasury by automobile owners were about \$52,000, or double what they were in March, 1909. Mr. Smith's conclusion, drawn from a digest of annual figures, is that the automobile pays more than sixty per cent. of the cost of road improvements in the whole State.

PLAN OUTING FOR ORPHANS

Between 3,000 and 4,000 orphans want to attend the festivities attending the annual automobile outing, which will be held this year at "Dreamland" Coney Island, June 2, but it is not certain that such a large crowd can be accommodated. Plans for transporting the children are being developed by the Automobile Day Committee of New York. The Women's Motoring Club will have charge of one section as usual and the New Jersey clubs have been invited to contribute cars and support. M. J. Budlong and William H. Haradon head the Car Committee.

NASHVILLE HAS AN AUTO CLUB

NASHVILLE, Apr. 25—The Nashville Automobile Club was organized recently in this city and its birth was enthusiastically welcomed by many automobile owners. Despite the fact that this city is a motoring center, there has never been a club here until now.

Permanent organization will be essayed shortly and it is the intention to have the organization in full working shape when the Glidden tourists arrive on their trip South. Leland Hume was named temporary secretary of the club.

BUCKEYES TO TOUR HOOSIERDOM

COLUMBUS, OHIO, Apr. 25—The Columbia Automobile Club has planned a reliability contest under the auspices of the club to be run to Indianapolis shortly before Decoration Day. The contest will be run at that time in order to permit autoists to attend the speed contests on the motor speedway at Indianapolis. The usual rules and regulations surrounding a reliability contest will govern the event. Already quite a number of the motorists of the Buckeye capital have signified their intention of participating in the contest.

WOMEN WORK FOR OILED ROADS

Women of Montpelier, Vt., representing the Woman's Club of that city have undertaken to influence public opinion so that a number of highways of the vicinity may be oiled. Last year an experiment was tried on about a mile of one of the roads just outside of town and the result was so favorable that the Woman's Club became interested. Montpelier is one of the favorite stopping places for cars en route from New York to the White Mountains.

RED CROSS SIGNS FOR DOCTORS

BALTIMORE, Apr. 25—Little signs, five inches square, containing a red cross on a white background, are being distributed to physicians owning motor cars by the Police Department of Baltimore, which give the medical men the privilege of speeding to calls without being held up by the police. These signs are to be placed on the left of the dashboard.

NATIONAL COMPILING RECORDS

The National Motor Vehicle Company of Indianapolis, Ind., has just from the press a leaflet giving a complete record of the winnings of the National car during the season of 1909. The information is concisely arranged, well printed, and should prove of much interest to autoists who follow this phase of the industry.

RUBBER TUBES ADVANCED IN PRICE

The Empire Tire Company of Trenton, N. J., has announced an advance of 30 per cent. in the prices of red automobile tubes and motorcycle tubes. The advance, according to the circular of the company, is due to the sharp rise in the rubber market.

PIERCE-ARROW ENLARGES OLD PLANT

In conjunction with the new buildings now in course of construction by the Pierce-Arrow Motor Car Company at Buffalo, the company is largely increasing the floor space of the old buildings of its plant. The improvements will all be ready for occupancy by late summer or fall.

The official declaration that the company would go into the manufacture of commercial vehicles has been made after a year devoted to tests and experimental work upon the road. One of the new buildings will be devoted to this branch.

MURKY SMOKE, A PREVENTABLE EVIL

In an address delivered recently before the West Side Y. M. C. A., 318 West Fifty-seventh Street, H. Clifford Brokaw treated of smoking automobiles and expressed a favorable opinion of the ordinance proposed by Alderman Nicoll, which is aimed to do away with offensive odors.

He took the position that murky smoke was not a necessary evil and that it could be prevented by the use of skill and care. He pointed out that smoke meant either too much oil being fed to the engine or faulty carburetor adjustment.

BEST MONTH IN OHIO MOTORING

COLUMBUS, O., Apr. 25—State Registrar of Automobiles of Ohio, Fred H. Caley, has announced his report for March, showing that 5,842 owners secured licenses paying in \$28,708. Manufacturers and dealers numbering 108 registered, while 700 chauffeurs secured licenses. The total revenue of the department was \$31,660. The department has now issued 17,500 licenses since the first of the year.

SPARE MOTOR WHEEL CO. REORGANIZED

The Spare Motor Wheel of America, Limited, has been reorganized, and will be known in the future as the United States Wheel and Rim Company, Limited, with increased facilities for manufacturing automobile rims, motor rims, and spare wheels. It is anticipated that the capacity of the plant will be somewhat more than doubled, despite the fact that the output is now in excess of 1000 rims per day.

INDOOR DEMONSTRATING COURSE

One of the floors of the Tichenor-Grand Building, West Sixty-first street, New York, will be used as an indoor testing track for the Maxwell and Columbia cars. The floor referred to was formerly used for a riding track. Cars will be demonstrated upon it when weather conditions make it impossible outside.

FIRST TOUR TOWARD SAVANNAH

Within a month, the Jacksonville (Fla.) Automobile Club plans to send out a scout car to map a route from Jacksonville to Savannah. The run is to be held this Summer, probably early in June. If the run is made, it will be the first that has ever been made into Savannah.

HILL CLIMB AT BALTIMORE PLANNED

During the first week in June the Automobile Club of Maryland will hold a hill-climbing contest on Edmondson avenue, Baltimore. The affair has attracted considerable attention among automobilists and numerous entries have been promised.

PAULHAN MAKES LONG FLIGHT

PARIS, Apr. 19—Louis Paulhan in his aeroplane flew 190 kilometers yesterday, starting at Orleans and finishing at Arcis-sur-Aube. The trial occupied three and a half hours.



Pathfinder Crossing a Bridge Near Corinth, Mass.

BETTER GOING FOUND IN ARKANSAS

After wallowing through the muck of Mississippi back to Memphis, the official pathfinder of the 1910 Glidden Tour crossed the Father of Waters, and at last reports was having an easier time of it on the journey to Dallas.

The Alabama, Tennessee and Mississippi bottoms proved a thorough test for the Chalmers "30" during this stage of the tour, and literally dozens of streams had to be forded that will be good roadways when the tour itself passes that way.

There has been little ease and recreation so far for the exploring party, because a strong shoulder and a sturdy arm have been far above par and have been in almost constant demand.

From Memphis the course of the tour extends sixty-two miles along the river to Trotter's Landing, where the official crossing will be made. This part of the course lies through an alluvial country, where negro residents outnumber whites, about ten to one. The dry weather that had been enjoyed for several days made this stretch a little easier than what had gone before, and reports from Arkansas that reached the party before crossing were that the roads on the western side of the big stream were in even better condition.

These reports proved to be well founded, for upon crossing, the party encountered fairly good going into Helena. The promises held out by the weather and the rising ground were made good in a large measure and satisfactory progress through Arkansas was achieved.

So far as it has proceeded, the pathfinding tour this year has been a record breaker in some respects. Some of the route has been over roads that could hardly be improved, but from the Kentucky-Tennessee State line almost into Memphis, the trip has been a terror. Unprecedented weather conditions which made anything that looked like a stream a raging torrent and covered hundreds of spots in the road with water that will be high and dry by June 1, worked to augment the labor of the pathfinders. Actual physical force and muscular endurance were required of everybody connected with the party and a great deftness in prying the car out of the soup-like mud was developed in all hands.

The streams and rivers of Tennessee, Alabama and Mississippi will long be remembered by the explorers for the problems in transportation that they propounded to the party.

Along the way, Scout Lewis has had many opportunities to do missionary work among the natives. Frequently when the crew was engaged in prying the pathfinder out of the mud, he would make impromptu addresses on the wide subject of good roads, his audience being residents of the locality who assembled quickly whenever the big car became stalled.

At Memphis the party was received with acclaim by the civic bodies and hospitably entertained by the Memphis Automobile Club. The worth of the Glidden Tour as a means of spreading the propaganda of good roads was the keynote of the addresses at the Business Men's Club and the mission of the automobile in carrying this message to the people was dwelt upon.

The road from Memphis to Helena was found to be of dirt and gravel for about one-third of its length and then came a



Woodland Trail Near Essery Springs



Where the Floods Covered a Lumbering Road



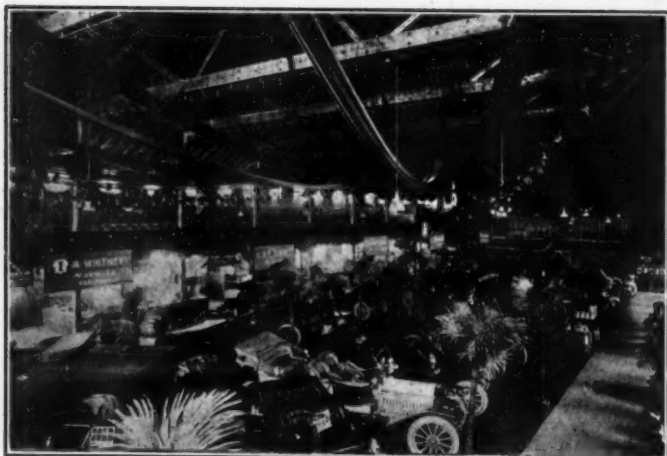
Fording a Stream Near Lawrenceburg, Tenn.



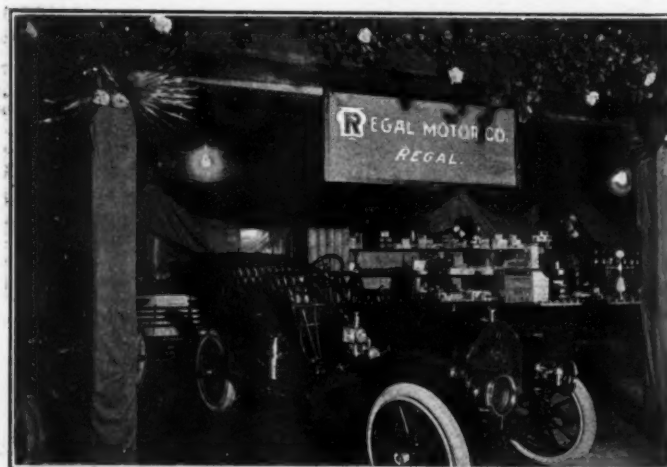
Crossing a Viaduct Nine Miles out of Franklin, Tenn.

long stretch of light clay. Active work with the split-log drag will make this part of the road an enjoyable stage. The Helena Business Men's League assisted the party materially in mapping this part of the tour and from Helena on to Dallas and from Dallas northward, all the way to Chicago, there will be official

(Continued on page 823.)



Interior of Bangor, Maine, Automobile Show



Stand Where Regal Cars Held Sway at Bangor Show



Rambler Exhibit at Maine's Premier Auto Show

RAIN FAILS TO SPOIL BANGOR SHOW

Despite rain and cold disagreeable weather during a large part of the week, the Bangor (Me.) Automobile Show scored a distinct success. Many cars were sold and hundreds of possible buyers were interested observers of the numerous exhibits ranged about the Auditorium. Society night, which was Wednesday, attracted a representative attendance, and the later sessions of the show, being more favored by the weather, made up in large measure for the disappointing "gate" of the opening nights.

The automobile parade, which was scheduled originally for Wednesday morning, had to be postponed, but when it took place, the delay did not serve to dampen interest in it.

PREPARE FOR 24-HOUR RACE

Extensive preparations, involving many improvements to the Brighton Beach race track, are being pushed along to make the track ready for the first 24-hour race of the year which is scheduled to take place May 13-14.

Besides numerous improvements in the runway of the track itself, a field stand is in course of construction and a stand for the chauffeurs is also being built. Improved score boards will be in place when the gates open and in a number of other instances details will be added to make the races more easily intelligible to the public.

The entry list has filled and the field will consist of twelve contestants. These are: Two Buicks, two Stearns, two Rainiers, Simplex, Houpt, Selden, Marion, Fiat and Renault.

The Motor Racing Association will conduct the affair.

CHARLES L. MCINTOSH DEAD

MILWAUKEE, Wis., Apr. 20—Charles L. McIntosh, president of the Pierce Motor Company of Racine, treasurer of the J. I. Case Threshing Machine Company and a banker of influential connections of Racine, died early Tuesday morning at Naples, Italy. Mr. McIntosh was stricken on April 6. With Mrs. McIntosh and several friends he was on his return from a tour of the world, began last January. Mr. McIntosh was a native of New York. He was born sixty-three years ago and was for many years secretary of the Jewel Belting Company of Hartford, Conn. About a year ago he played an important part in the reorganization of the A. J. Pierce Motor Works at Racine, now the Pierce Motor Company.

FOUR JOIN ACCESSORY ORGANIZATION

The following named concerns were elected as members of the Motor and Accessory Manufacturers at the meeting of the board of directors:

Sherwin-Williams Company, Cleveland, Ohio, manufacturers of paints and varnishes.

E. B. Van Wagner Manufacturing Company, Union Building, Syracuse, manufacturers of die moulded, finished metal castings.

George A. Haws, 73-75 Pine street, New York, manufacturers of greases and oils.

Gasoline Motor Efficiency Company, 1 Exchange place, Jersey City, manufacturers of "The Homo" device.

SHARPLY OPPOSE CALLAN BILL

Sharp opposition to the Callan bill, now before the New York State Senate is being urged in some quarters of motor-dom. These objections are being centered against two clauses of the proposed law. The first is that it fails to provide a universal speed regulation. The second is that the clause applying to taxation is exorbitant in its terms. The law as passed by the lower house provides for a tax according to horsepower of from \$5 to \$25.

AGAIN SECURES ENGINE CONTRACT

The Falls Machine Company of Sheboygan, Wis., which some months ago received the contract for building all engines used in the "Warren-Detroit" by the Warren Motor Car Company, during the present season, has been favored with a renewal and will produce all 1911 engines for this concern. The 1910 contract called for 1,000 motors.

TRUCK-MAKERS SEEKING SITE

The Minneapolis Motor & Truck Company of Minneapolis, Minn., is negotiating with business men at Beaver Dam, Wis., a stove and foundry center, for the purchase of the cotton mill property and move its plant. The concern produces motor trucks from one to six tons capacity, listing at \$1,000 to \$4,000.

ALL READY FOR HARRISBURG RUN

With a strong entry list and every prospect of a number of eleventh-hour additions, the Motor Club of Harrisburg has every reason to be satisfied with the outlook for the three-day road contest that is scheduled to take place May 9, 10 and 11. Many well known makes of automobiles will contest and the route, which is through virgin territory in large part, has been selected to give the cars a thorough try-out.

The interest in the run is shown by the fact that four cities through which it passes have donated nine cups and trophies in addition to those given by the Wildwood Automobile Club, the Harrisburg Board of Trade and several others.

The route of the tour is through Lebanon, Reading, Pottstown, Norristown, Philadelphia, Hammonton, N. J., to Atlantic City.

Southern New Jersey will be pretty thoroughly covered during the second day of the run and Wildwood will be the night control. The third day's run will be back to Harrisburg where the cars will be turned over to the technical committee of which David Beecroft is chairman.

W. R. Douglas will act as referee. Four classes of touring cars and runabouts ranging in price from over \$2,001 to under \$1,601 and classified under the general provisions of the A. A. A. rules will compete. The event is the fourth annual contest of the Harrisburg Club.

RACE MEET INTERESTS MEMPHIS

Two events, scheduled for the near future have caused much interest to be aroused in the Memphis Automobile Club, and as a result of the increased activity of the members in club matters, there is a movement on foot to elect a salaried secretary to carry on the good roads work and to attend to the welfare of the club in other directions.

The two events referred to are the Glidden Tour and an automobile race meeting which is scheduled for May 21-22. The race meeting, which will be held on the Tristate Fair Grounds, has a program of events varying in distance from five to 100 miles with cash prizes for the winners. The manager of the affair is Homer C. George. The meet has official sanction.

U.S. MOTOR'S DETROIT COMMERCIAL PLANT

It is announced that the United States Motor Company will commence within two weeks, the building of a large commercial vehicle plant at Detroit. This factory will cost \$700,000 and its plans consider a building of enough size to turn out 4,000 light delivery wagons during 1911. The main building will be 1,000 by 150 feet, and will be supplemented by several others, including a drop-forge plant, and a foundry.

The project will not interfere with the Alden-Sampson factory which will be operated as the heavy duty department of the commercial vehicle division, while the Detroit plant will manufacture light cars.

NEW COMPANY TO MAKE SPARK PLUGS

During the past week the Fry Manufacturing Company, recently incorporated by Walter L. Fry, Charles J. Kleber and others for \$100,000, opened a new suite of offices at 1779 Broadway, corner of Fifty-seventh street. Mr. Fry is president and general manager, while Mr. Kleber will officiate in the capacity of secretary and treasurer. This newly organized company now has the exclusive sale of the Fry Spark Plug formerly marketed by the Standard Sales Company, which is now in liquidation.

ECONOMY TEST OF C. M. C. POSTPONED.

Rough roads have caused the postponement of the annual economy run of the Chicago Motor Club from April 28 to May 5. The run will be 200 miles to Lake Geneva and return. The route was reported so rough that an adequate fuel test was considered out of the question.



Beautiful Scenery Marked Part of Pathfinder Route



Water in Quantities Met Jersey's Pathfinder Car



Near Hammonton, the Pathfinder Found Much Deep Mud

AROUND NEW JERSEY RELIABILITY RUN

One of the most interesting routes through New Jersey has been selected by the pathfinding party of the "Around New Jersey Reliability Contest" which takes place May 10 and 11. A Maxwell car picked out the route to be followed and on account of the extremely bad weather at the time that trip was made, the pathfinders experienced a trying time.

The run starts from Fifty-seventh street, New York, but the actual course commences at Jersey City. The route will be through Elizabeth, Rahway, New Brunswick, Red Bank, Point Pleasant, Lakewood, Port Republic, Oceanville, Pleasantville, to Atlantic City. The second day's run is via Pleasantville, Egg Harbor, Hammonton, New Brunswick to New York.

Present Status of Selden Patent Litigation

LITIGATION under the basic Selden patent has progressed rapidly recently. The present status of the matter is about as follows:

The original suits filed on behalf of the A. L. A. M. companies against seven unlicensed manufacturers in the Federal Court at Detroit have been supplemented by a similar action in that court against the Imperial Automobile Company of Jackson, Mich., and by suits against the Paterson Company of Flint and the Flint Wagon Works, both of which were commenced in the Northern Division of the Eastern District of Michigan.

Service was had upon each of the defendant companies and leave to plead was granted. The Columbia Motor Car Company and George B. Selden are plaintiffs of record in each suit.

Similar litigation was also commenced against the Parry Automobile Company of Indianapolis.

The complaints in all the suits allege that the defendant companies are infringing the patent, involving the principle of compression gasoline engines applied to the propulsion of carriages.

The defendants in Detroit and elsewhere announce that they will fight the cases to ultimate decisions and in a series of conferences tentative plans of action have been discussed. The Abbott Motor Company has taken a decided stand in the matter and several of the other defendants have gone over the situation with the Abbott Company's officers with a view to concerted action.

The Abbott Company gave out a statement a few days ago in which it was stated that the company does not believe in the validity of the Selden patent. The fact was alleged that while the matter had been in litigation for seven years, no final decision had been reached in the courts supporting the claims of the Selden advocates.

The suit of the Electric Vehicle Company et al. against the Ford Motor Car Company et al., which is pending before Judge Hough of the Federal Circuit Court of New York, progressed another step toward a final decision within the past week. The plaintiff prevailed at the hearing last fall and the present action is for the purpose of substituting the Columbia Motor Car Company as plaintiff in place of the Electric Vehicle Company, which it has succeeded.

A motion was made for leave to file a bill embodying such a

substitution and after argument Judge Hough ruled in favor of the motion. The bill was accordingly filed and subsequent proceedings will follow in course.

In the meantime, the situation has been complicated to a certain extent by the filing of a suit against the various companies making up the A. L. A. M., on behalf of the Velie Motor Vehicle Company of Moline, Ill. This action was commenced in the Federal Circuit Court at Milwaukee and demands \$500,000 as damages.

The bill of complaint sets up ten different causes of action or counts. The first of these alleges that the A. L. A. M. is an unlawful combination in restraint of trade within the purview of the Sherman act.

Second.—That the A. L. A. M. notified the plaintiff to enter the combination, demanding \$17,000 and restricting the output of the company to 2,500 cars in 1910.

Third.—That when plaintiff declined to enter the combination, the defendants threatened to injure the business of plaintiff.

Fourth.—That the defendants conspired to prevent plaintiff from purchasing materials.

Fifth.—That they conspired to prevent proper advertising of plaintiff's output.

Sixth.—That the defendants through conspiracy prevented the Kopmeier Motor Company, agent of the plaintiff at Milwaukee from exhibiting the Velie car at the show in Milwaukee last winter.

Seventh.—That a New York advertising agency had informed the plaintiff that it could not handle the advertising of the Velie company because it would lose business of \$75,000 a year by so doing.

Eighth.—That the A. L. A. M. in pursuance of the alleged conspiracy endeavored to prevent the extension of credits at banks.

Ninth.—That the defendants have conspired to prevent prospective purchasers from buying Velie cars.

Tenth.—That they have tried to get contract customers to break the terms of their contracts with plaintiff.

Service in this action has not yet been made upon the A. L. A. M., but it is expected shortly. Alfred Reeves, general manager of the association, returned Tuesday from the West. He made no statement with regard to defense.

Clark Enters Commercial Vehicle Field

WITH the reorganization of the Clark Power Wagon Company and the merger with it of the Ferguson Motor Company, the capitalization of the company has been increased from \$50,000 to \$500,000. The company will enter the commercial field with an adequate plant at Lansing, Mich. The men who compose the company are Frank G. Clark, president, who was the sole owner of the concern formerly known as Clark & Company. Mr. Clark became interested in the future of the commercial car some time ago and the present company is the result of his determination to go into the manufacturing of that type.

R. A. Radle, of Detroit, is treasurer of the new company. Mr. Radle is well grounded in the mechanical end of the business and has demonstrated much ability in selling. He is to be factory manager and in addition, he is connected with the Radle-

Clark Sales Company of Detroit, which is closely allied with the Clark Power Wagon Company.

His history in the trade has been brilliant in both directions and much of the success of the Grabowsky Power Wagon Company, and the Rapid Motor Vehicle Company are credited in a measure to his efforts.

John Demmler, chief engineer, has been identified with the Packard Motor Car Company and was formerly connected with a number of European factories in important capacities.

B. H. Warner, superintendent of machines for the Sheffield Car Works at Three Rivers, Mich., for several years, has been named vice-president and superintendent.

The car which will be turned out is a twenty horsepower, two-cylinder vehicle having a load capacity of 1000 pounds.

JOHN E. GEORGE, AUTO COMMISSIONER

BALTIMORE, Apr. 25—Governor Crothers has appointed John E. George, of Queen Anne's county, automobile commissioner, the position specified under the new Swann Motor Vehicle Law. He takes office the first Monday after May 1.

BRIDGEPORT HILL CLIMB IS DECLARED OFF

Owing to objections, raised by the city of Easton to the use of roads for such a purpose, the hill climb planned by the Automobile Club of Bridgeport, Conn., has been indefinitely postponed.

Court Ruling Upsets Second Offense Prosecution

WHEN an operator of an automobile is arrested for over-speeding and is held for trial by the examining magistrate, he cannot be tried in the upper court in an action based upon second or subsequent offenses, providing such offenses were not alleged and investigated before the committing magistrate.

This important ruling was laid down last Tuesday in the case of the People of the State of New York against Walter Reppin who was prosecuted in the Court of Special Sessions for a second offense of speeding.

Judge Olmstead in rendering the opinion of the court said: "The defendant was arrested and arraigned on a charge of unlawfully operating a motor vehicle at a speed of 25 miles an hour, under Section 291, Chapter 30 of the laws of 1909. Three

days afterward the District Attorney filed information against the defendant charging the crime of operating a motor vehicle at a greater speed than is allowed by law as a second offense.

"Counsel for the defendant moved to dismiss the action on the grounds that he had not been accorded a preliminary examination of the offense charged in the pleadings before the court. He contended that "second offense" was an aggravated misdemeanor under the statute and that the examining magistrate had not considered such a charge in holding him for trial.

"The defendant was not accorded his rights to examination before the magistrate as to whether he was the Walter Reppin who was once convicted for unlawfully operating an automobile. And in that respect a substantial right has been denied him. The case will be dismissed."

Better Going Found in Arkansas

(Continued from page 822.)

convoys for the pathfinder, furnished by the local organizations.

One of the most interesting phases of the tour proper will be the journey across the "Black Wax" belt of counties in northern Texas. Under ordinary conditions this stretch of the tour will be delightful, but in stormy weather or after heavy rains the prospect is appalling. Local reports say that bottom is forty feet below the surface, but of course such statements are exaggerated.

That particular part of the route had experienced dry weather for over a week and the pathfinder found hard roads.

From Dallas northward the route is across comparatively level country and in very dry weather the sand storms are the features least to be desired. However in June such unpleasant results are not to be anticipated or feared.

LITTLE ROCK, ARK., Apr. 23.—The last half of the run from Memphis to this city was mapped out yesterday by Dai Lewis over roads most of which are unexcelled in any Glidden tour. The crossing of the Mississippi and White rivers, where there would be danger of losing time ordinarily, has already been arranged for and there will be such ferry accommodations that an hour and a half at the outside, will suffice to get all the contestants over both streams.

The Chalmers 30 had to make a ten-mile detour in getting over White river because of the high water at this season. Guiding parties from Helena, Marvel, Blackton, Clarendon, Stuttgart and Little Rock conducted the road hunters over the entire trip by relays. At Clarendon the White river was crossed. The course bent after this to take in Stuttgart, a city of 3,000, settled by German farmers and resembling a far western city more than a southern town. Sixty motor cars are owned here and agents have more advance orders than they can handle. Stuttgart is on Grand Prairie, a plateau of magnificent alluvial

land, west of the White river. Rice is the chief product and the largest rice mill in the world is at Stuttgart.

The roads are at present almost perfect, being the typical winding prairie highways on which the only speed limit is the car's power. The last 14 miles into Little Rock is over macadam pike, the like of which has not been seen since the pikes of Kentucky were left behind. The night entry into Little Rock spoiled the reception planned by the local automobile club, whose enthusiasm resembled that which has been general during the past three or four days and which is centered chiefly in good roads. A delegation from Hot Springs brought the best information and blue print maps to Dai Lewis immediately upon his arrival.

Little Rock has 65,000 inhabitants and in almost every block there are building operations under way. Very recently the coal resources of Arkansas have been made available for her own capital and a manufacturing boom is expected. Here, as in the rest of the State, one remarks the initiative and hustle that has come to be associated with the new West.

The pathfinder experienced a delightful time on the last leg of the Southern trip. The black wax of Northern Texas had no terrors for the party and reports of the course during the final 215 miles into Dallas, show the roads in fine condition. The car made forty miles an hour in favorable localities.

The Glidden Tour will make Omaha a night control. This decision was reached during the Eastern trip of S. M. Butler, chairman of the Contest Board of the A. A. A., en route home from California. When he reached Omaha, a delegation from the newly formed Nebraska State Automobile Association waited upon him and brought such pressure to bear that Mr. Butler decided to have the official tour extended across the Missouri river from Council Bluffs. Mr. Butler ordered the pathfinding party which is now in Texas, to map a route into Omaha. The change in the original plans will make the tour one day longer.

SMOOTHING OUT HOOSIER SPEEDWAY

Alfred Reeves, general manager of the A. L. A. M. visited the Indianapolis Speedway while en route east. When Mr. Reeves was there he says he saw cars doing about 100 miles an hour.

"While the track is still a little rough from the edges of the cement and brick used to improve it and is hard on tires as it stands now, a squad of men are working with cement levelers to grind down the rough spots and when the big meet takes place next month, the course will be in vastly improved shape."

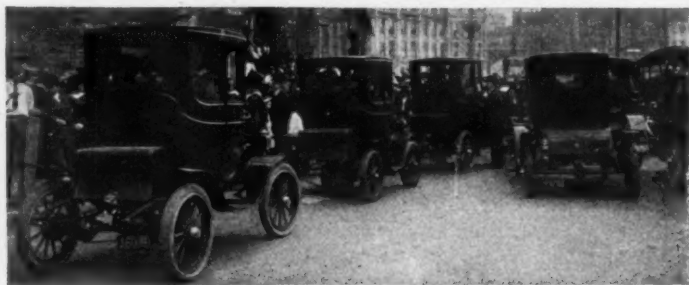
Mr. Reeves says that the weather was cold in the West.

A. C. A. TO HEAR OLD MUSIC, MAY 3

A "Smoker Concert" at which Hans Kronold, 'Cellist, and a choir quartet will entertain the members and guests of the Automobile Club of America at the quarters of the club in Fifty-fourth street, New York, will be given May 3.

The occasion is one of the regular club nights of the organization, but special effort is being made to have the program considerably out of the ordinary course. The music to be given will all be of the ancient school. Refreshments will be served after the entertainment.

With the Agencies



Reception given to Ex-Vice-Prest. Fairbanks, at Indianapolis, on his return from around the world. Picture shows the Waverley electrics used to carry the ladies

C. S. Briggs, president and manager, K-R-I-T Motor Car Company, Detroit

A new depot at Newport, R. I., will be operated this season by the Foss-Hughes Company, which handles the Pierce-Arrow car in several big cities. The garage in connection with the depot will have facilities for handling 275 cars. Full lines of accessories and a complement of mechanics, trained at the Pierce-Arrow factory, will be on hand.

During the past few weeks the Selden Motor Vehicle Co., of Rochester, N. Y., has appointed a number of new agents, among whom are the Gibbs Machinery Co., Columbia, S. C.; T. T. Maxfield, Bloomfield, N. J.; S. A. Whedon, Appleton, Wis.; Harrison Auto. Co., Birmingham, Ala.; Du Puy Motor Car Co., Houston, Texas, and E. B. Searle, Noank, Conn.

Renault Freres have opened a branch agency in Honolulu, H. I. The Van Hamm-Young Company (Limited) has secured the agency and will handle the new "American Special" 25-35, which is said to be well fitted to the exceedingly hilly country throughout the archipelago.

R. B. Edwards and H. D. Biggs, proprietors of the Broadway Garage & Sales Company, of Kansas City, Mo., have taken the agency of the Clark cars in adjacent territory. They will handle these cars exclusively.

The Brandt Motor Car Company, Cleveland, has taken the agency for the Acorn truck. The Acorn is a light delivery wagon. The Brandt Company is Cleveland distributor for the Kissel-Kar.

The Highland Garage Company, North Tarrytown, N. Y., has been granted the agency for the "Cole 30" by the Colt-Stratton Company, eastern distributors for the Cole Motor Car Company.

The Remy Electric Company, of Anderson, Indiana, manufacturers of the well-known Remy magneto, will open a branch distributing office in Boston, Mass., within the next two or three weeks.

Manager Harry Kortz, of the Euclid Automobile Company, Cleveland, has just opened agencies for the Atlas and Firestone-Columbus at Akron, Canton, Youngstown and Ashland.

After May 1 the location of the New York branch of the G & J Tire Company will be at 1924 Broadway. The branch at 10 West Sixtieth street will be discontinued.

The Apponaug Automobile Company, Apponaug, R. I., has taken on the agency of the "Cole 30" for Rhode Island. This agency was placed by the Colt-Stratton Company.

The Vail Motor Car Company, Northern Ohio distributors for the Clark and the Empire cars, have appointed agents in ten Ohio towns within a week.

The Smith & Rheineck Company, Rockwell avenue, has been appointed distributors of the White line for Cleveland and vicinity.

A. W. Lund, of River Falls, Wis., is a new agent for the Studebaker Automobile Company.

Cook and Carter, of Delaware, Ohio, have taken the agency for the Ford in Delaware County.

Personal Notes of Prominent People

George S. Patterson, who at different times has been sales manager for the Rambler, Reo and Premier cars, has been chosen general manager and director of sales by the Gaeth Automobile Company, of Cleveland. Paul Gaeth, president of the company, announces that the company will greatly increase the capacity of the Cleveland plant and manufacture over 500 cars during 1911.

M. Wertheimer has been taken into the Oxford Automobile Company, which handles the Brush car in Philadelphia, and with the addition to the company's personnel the company acquired the sales rights in the Quaker City and adjacent territory for the Inter-State car, the Muncie, Ind., product. The concern will still continue to do business at 518 North Broad street.

John D. Murphy, formerly with the Boston *Globe*, and the Maxwell-Briscoe Motor Company, advertising department, has accepted the position of advertising and publicity manager of the Selden Motor Vehicle Company, Rochester, N. Y. His many friends in the trade wish him success in the new venture.

John C. Perrin, superintendent and designer of the Lozier Motor Company will sail on April 28 for an extended trip through Europe. The Plattsburg works of the Lozier company will be in charge of Asst. Supt. Pollard during the absence of Mr. Perrin.

Gerald P. Hall, formerly identified with the sale of Midland Motor Company's product, has severed his connection with that concern to join the Pennsylvania Auto Motor Company, of Bryn Mawr, Pa., as general sales manager for the "Pennsylvania" company.

S. M. How, for two years with the Haynes Automobile Company, Kokomo, Ind., as special representative, has resigned to accept the management of the sales force of the Barger Automobile Company, of Cleveland.

Morris Grabowsky, for seven years secretary of the Rapid Motor Vehicle Company, has been appointed head of the commercial vehicle department of the United States Motor Company.

Marcus Allen has been appointed manager of the G and J Tire Company in New York. He will take charge of the new branch at 1924 Broadway as soon as it is opened.

Joseph H. Greenwald, Cleveland agent for the Marmon line, has leased larger quarters and will move to Euclid avenue and E. Sixty-fifth street.

Among the Garages



Maxwell four-cylinder car, of Sportsman type, in which R. M. Brown crossed the Alleghenies recently, being the first to make the trip this year

Morris Grabowsky, manager commercial vehicle division, U. S. Motor Company

The new garage of the Zeil Motor Car Company, Baltimore, Md., is ready. Tapestry brick with tooled concrete columns and trimmings compose the front. The roof projects over the third floor line in front and its large, semicircular, green tile covering adds a live dash of color to the structure. On the first floor is the showroom, 50 feet square. At the rear of the room are mezzanine offices. In one of the corners of the showroom is a complete accessory department; directly underneath are stock-rooms for carrying spare parts, supplies and tires. Storage facilities are provided on the entire second floor.

Motor garage opening is to be the central point of interest in automobile row in Minneapolis for the next two weeks. The Studebaker Brothers will be ready to move into their new building next week, as will also the management of the new electric garage, which will be the home of the Detroit Electric. The White garage is rapidly nearing completion, and the MacArthur-Zollars garage, at Thirteenth street and Nicollet avenue, is also about ready for a formal opening.

The Black Manufacturing Company of Chicago has sent M. E. Hoshaw to Elkhart as its personal representative in accepting completed cars from the Crow Company and attending to their disposition. He is to be manager of the traffic department and sales agent for that section. The Crow Company is turning out three to five cars per day.

As soon as the work of remodeling the building at 2337-2339 Michigan avenue, Chicago, is completed, the Federal Motor Car Company, recently incorporated to handle the Ideal electric car, will occupy the premises. This is expected to be about the first of June. The officers of the company are A. B. Carson, president, and J. L. Carson, secretary and treasurer.

The Powers Motor Car Company, Lawton, Okla., is erecting a two-story building with concrete floors and all modern improvements. The building fronts on E avenue, besides the 75-foot frontage opposite the postoffice. There will be an entrance driveway for motor cars to the north, south and east, giving easy access and egress.

Extensive alterations and additions to the garage of the Central Ohio Motor Car Company, at 61 East Spring street, Columbus, Ohio, have been completed. The office has been moved to the second floor giving more space for the showroom. An up-to-date repair shop has been installed and a large addition erected in the rear.

Southwork Brothers, Biddeford, Me., have just awarded the contract for the erection of a three-story garage of concrete. This will be located on Preble street, between Oxford and Portland streets, will have a floor layout of 150 feet deep by 100 feet front, and will cost, it is said, \$40,000.

George P. Lininger has opened a garage and repair shop in Greencastle, Pa. There are about twenty cars in the town, which

is located on the old turnpike passing through Gettysburg, Waynesboro, Greencastle and Pittsburg, very well located to help cars over the direct route.

The new garage of E. S. Hessels at White Plains, N. Y., is approaching completion. The building is 50 by 125 feet, and is of brick and cement construction, about half of which is two stories high. It is expected that it will be ready for occupation about May 15.

In Ensley, Ala., the Morrison Motor Company, recently organized, will build on Avenue E, opposite the Elk's Home, a two-story garage of brick and concrete. John Morrison, a former lumber dealer, is president and financial head of the new concern.

The Studebaker repository at South Bend will be the headquarters for the E-M-F and Flanders cars in that city. The Studebaker Automobile Company has completed arrangements by which the cars will be sold from the repository.

A new garage with repair shop has been completed at Sixth and Walnut streets, Oklahoma City, Okla., by V. W. Shaler, to be known as the Standard Auto Garage. Mr. Shaler has the agency for the Standard Six and Halladay cars.

The Union Motor Car Co., 304-310 Central avenue, East Orange, N. J., has completed the erection of a large fireproof garage, immediately in the rear, in which a modern machine shop is being installed.

The McIntyre Automobile Company has moved into its new garage at 2203 Farnam street, Omaha, Neb. The garage is a commodious one, with all the modern appointments, the building being 25 by 128 feet.

A large fireproof garage, built at a cost of \$25,000, will be leased by Harry Griffin and Chester Scott, Appleton, Wis. The garage will be 50 by 125 feet in dimensions, one story high, of solid brick and concrete.

Fred G. Hodges is building a \$5,000 garage for the Foss-Hughes Motor Car Company at Wilmington, Del. A large stable is being remodeled for the purpose.

A. D. Foster has bought from Sherman & McConnell the brick garage occupied by the Electric Garage Co., at 2218 Farnum street, Omaha, Neb., for \$40,000.

The State Garage is the name selected by the Auto Trading & Garage Company for its new headquarters at North avenue and Oak street, Baltimore.

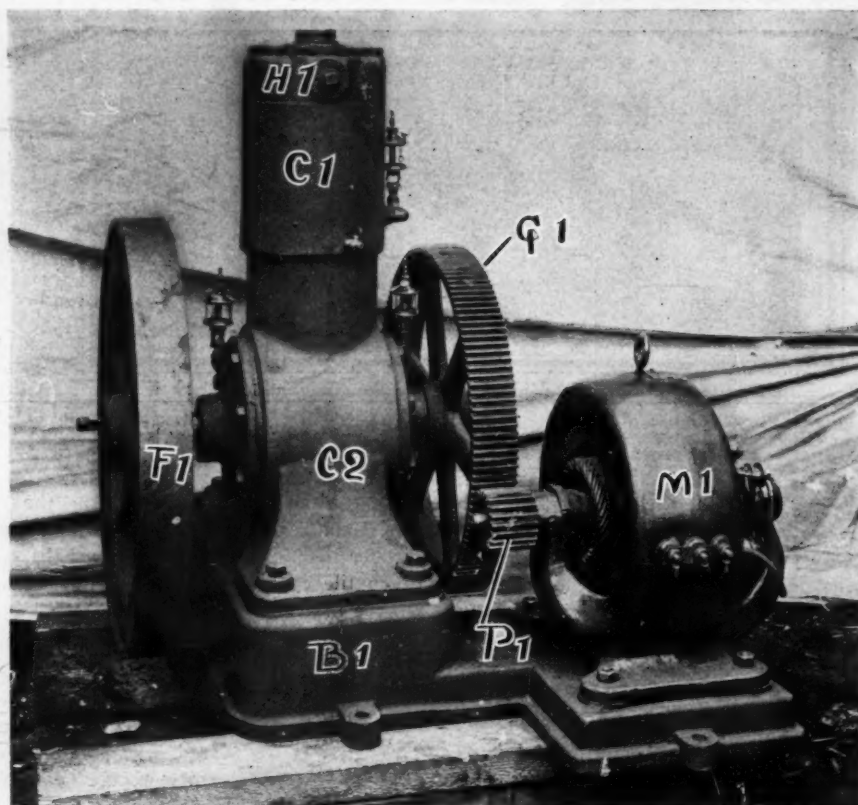
The North Shore Garage Company's new building, at Huntington, N. Y., is to be 50 by 225 feet, instead of 50 by 20, as first reported.

The Maxwell-Briscoe Motor Company, Indianapolis, Ind., is now located at its new three-story garage at Illinois and Vermont streets.

Charles Fenn will build a public garage at Antigo, Wis.

FAIRHURST AIR PUMP

The illustration here afforded is of the new Fairhurst Air Compressor as made by the American Air Compressor Works, 26 Cortlandt street, New York City, has been designed with a view to particular use in garages and plants wherein automobiles are made. It is intended to serve for any of the purposes to which compressed air is devoted, as in the inflation of tires, in connection with sand-blast equipment, pneumatic riveting, etc. The compressor is of the single-cylinder, vertical type, with a separable head H₁ securely bolted to the cylinder C₁, the latter being integral with the crank-case C₂, which is bolted to the sub-frame B₁, the latter being extended out to take the electric motor M₁, which furnished the power to drive.



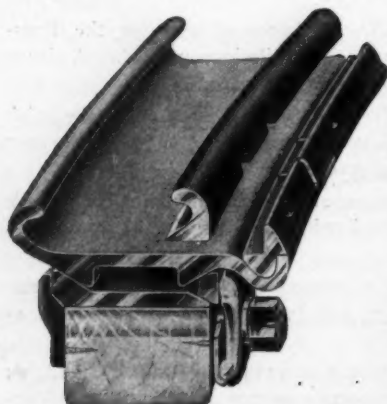
Prominent Accessories

FIRESTONE DEMOUNTABLE RIM PRESENTS NEW FEATURES

One of the more recent improvements in demountable rims is the safety locking ring (in groove at extreme right of cut) that forms a part of the Firestone quick detachable rim with which Firestone demountable rims are equipped.

This locking ring is so shaped that it absolutely prevents the rim from coming apart and releasing the tire, no matter how severe the strain.

As illustrated herewith, the locking ring has a bearing not only



Firestone Rim With Locking Ring

on the under side of the clincher side-ring, but also on the outside edge of the base of the rim. It will be seen at a glance that the locking ring is held immovably and cannot possibly turn over in its grooves. The projection of the locking ring to an unusual height brings a strong support to the back of the clincher side-ring.

The pins on the locking ring engage the slots in the clincher side-ring,

forming a guide that ensures proper seating of the locking ring in its groove. They also prevent circumferential motion. In the quick detachable feature as well as in the demountable rim itself, the Firestone company regards safety as a prime requisite.

UTILITY IN GLOVES FOR THE WOMAN WHO DRIVES

Women are entering into the real pleasure of driving motor cars with added zest as the difficulties that formerly surrounded the sport are being removed.

In order to manipulate the steering wheel with comfort it is necessary to have the hands well protected and with that object in view the industry of making gloves for women drivers was instituted.

The Fried-Ostermann Company of Rockford, Ill., is marketing a full line of gloves of this description. They are said to be serviceable, well-appearing, daintily made and to embody all the latest practical improvements in glove-making of this character. The company announces that its catalog in colors, fully outlining the goods, may be had on application.

In the making of these gloves, the finest of leather is used, and the workmanship is also up to a fitting standard, much hand work being utilized.



New Style of Auto Glove for Women